

EXHIBIT 53
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UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TEXAS
SHERMAN DIVISION

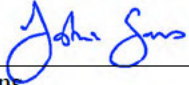
The State of Texas, et. al.
Plaintiff,

v.

Google LLC,
Defendant.

Case No: 4:20-cv-00957

Rebuttal Report of Joshua Gans



Joshua Gans

Dated September 9, 2024

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I. INTRODUCTION

A. Assignment

1. I have been retained by counsel for the State of Texas to provide expert analysis and opinions on behalf of all of the Plaintiff States in this case. As part of my assignment in this case, on June 7, 2024, I submitted an opening expert report (Gans Opening Report). On July 24, 2024, I submitted an Errata statement and Supplemental Appendix D to my Opening Report.¹

2. To summarize, in my Opening Report, I: (a) analyzed and defined relevant antitrust markets, (b) evaluated whether and the extent to which Google has monopoly power in these markets, and (c) assessed any effect or impact, if any, of Google's conduct on competition and consumers. Based on my specialized knowledge in economics, review of facts and data, and application of established economic principles and methods to the facts of this case, I explained my opinions and findings regarding: (a) the four relevant product markets in this case and the relevant geographic market; (b) Google's possession of monopoly power in at least three relevant product markets in the relevant geographic market of the United States; and (c) Google's anti-competitive conduct that has enhanced and maintained its monopoly power in these relevant markets.

3. Google's retained experts submitted reports on July 30, 2024, and August 6, 2024. As discussed below, some of Google's reports address my Opening Report, as well as issues on which I have the expertise to evaluate and opine.² As part of the Plaintiff States' opportunity to submit rebuttal expert opinions and reports, I have been asked to evaluate and submit a report (Gans Rebuttal Report) in response to Google's reports and offered expert opinions, as they relate to my opinions and expertise. As in my Opening Report, in this Rebuttal Report, I am not expressing any legal opinions. My opinions are again based on my specialized knowledge in economics, review of facts and data, and application of established economic principles and methods to the facts of this case.

4. My qualifications, CV, and case list, which are attached in Appendices A and B of my Opening Report, are unchanged. My compensation also remains unchanged. My consulting rate for this matter is \$1,000 per hour. Keystone Strategy assisted me in preparing this report. Keystone's billing rates range between \$340 and \$890 per hour and may receive additional compensation related to Keystone's overall performance. My compensation does not depend on the outcome of this case.

¹ As stated in the Errata, none of the changes in that Errata affect my opinions in this case. Supplemental Appendix D reflects a list of the materials relied upon and considered for the Gans Opening Report and likewise does not change my opinions in that report.

² Those Google reports include the reports of Professors Michael Baye, Anindya Ghose, Paul Milgrom, Martin Rinard, and Itamar Simonson.

5. A list of all documents, including transcripts, considered in this report is attached as Appendix A. I understand that document productions are ongoing in this case and that additional relevant documents may be produced in this case by Google and third parties right before and after I issue this report. I also understand that after I submit this Rebuttal Report, expert and fact witnesses for Google and the U.S. Department of Justice and other plaintiffs will be testifying at trial in the parallel case pending in the Eastern District of Virginia (United States et al. v. Google LLC, No. 1:23-00108). I may, and reserve the right to, review and rely on additional documents, including transcripts and testimony, in conducting my work and forming my opinions in this case. I reserve the right to supplement or amend this report if my opinions change or require supplementation as a result of my ongoing review of documents. I reserve the right to use graphics, figures, and/or illustrations at trial to depict my conclusions.

B. Summary

1. My Opening Report Applied Accepted Economic Methodologies to the Evidence in this Case.

6. In my Opening Report, I relied on data, documents, and deposition testimony from Google, as well as from multiple third-party publishers, advertisers, and competitors, and economic publications, principles, and accepted standards and methodologies,³ in conducting the following evidence-based analyses:

7. **Market Definition:** I separately employed two accepted methodologies in evaluating and defining the relevant antitrust markets: (1) the Brown Shoe factors based on the seminal U.S. Supreme Court case⁴ that has also been applied as a standard market definition tool by economists, and (2) the hypothetical monopolist test (“HMT”), which economists use to evaluate the group of products or geographic area in which it would be profitable for a hypothetical monopolist to impose a “small but significant and non-transitory increase in price” (“SSNIP”) or an equivalent reduction in quality. In evaluating the relevant product markets, I also analyzed and explained in detail why certain products are not reasonable substitutes and are not included in the relevant product markets. The empirical evidence I employed included data on prices and product costs, empirical tests conducted by Google, natural experiments, Google documents, deposition testimony by advertisers, publishers, and competitors, the analysis of antitrust agencies worldwide, and the views of industry participants. After applying these methodologies and conducting my analyses, I concluded that there are four relevant product markets in this case: (1) the market for publisher ad servers used for the sale of open web display advertising inventory, (2) the market for ad exchanges for transacting indirect open web display advertising, (3) the market for ad buying tools for small advertisers

³ See Gans Supplemental Appendix C.

⁴ *Brown Shoe Co., Inc. v. United States*, 370 U.S. 294, 1962.

for buying open web display advertising space and, (4) the market for ad buying tools for large advertisers.⁵ I also concluded that the relevant geographic market for each of these four markets is the United States, a conclusion that Google's Experts do not dispute.

8. **Monopoly Power:** Based on accepted economic principles for identifying monopoly power in the defined relevant markets, I conducted an evidence-based evaluation, including evidence of market shares, unique product features, customer switching costs, and barriers to entry. I also evaluated the history of entry, the role data and data targeting play, and the advantages data provides to Google's products. After applying these methodologies and conducting my analyses, I concluded that Google had and continues to have monopoly power in three relevant product markets in the relevant geographic market of the United States: (1) the market for publisher ad servers used for the sale of open web display advertising space in which Google has [REDACTED] market share⁶ and in which switching costs, as well as barriers to entry, are high, (2) the market for ad exchanges for transacting indirect open web display advertising, where Google has [REDACTED] market share in 2020 and barriers to entry are high⁷ (3) the market for ad buying tools for small advertisers for buying open web display advertising space where Google market share [REDACTED] in 2019,⁸ and barriers to entry are high.

9. **Google's Conduct at Issue in this Case:** I then evaluated the actions and choices, or conduct, of Google that, as I conclude, were anti-competitive and allowed Google to enhance and maintain its monopoly power in each of the defined relevant markets. Specifically, I evaluated:

10. **Tying:** Google's tying of its publisher ad server (DFP) to its exchange (AdX) harmed competition and enhanced Google's monopoly power in the relevant ad server market.⁹ The evidence I evaluated showed that Google tied access to its ad exchange, AdX, to the use of its ad server, DFP. The empirical evidence shows that access to AdX outside of DFP is effectively blocked. AdX has monopoly power in the ad exchange market, and AdX is effectively the only avenue to access demand from users of Google Ads. Google documents and deposition testimony also recognize that publisher ad servers and ad exchanges are separate products. Google's tie has increased Google's market power in the ad server market by increasing

⁵ I sometimes refer to these markets as the ad server, ad exchange, and small advertiser and larger advertiser buying tools market. See *infra* n.6.

⁶ Gans Opening Report, Figure 9. Also see Figure 9 of this report.

⁷ Figure 12.

⁸ Figure 13.

⁹ As I cited in my Opening Report, in my Rebuttal report, I use "ad server market" when referring to the market for publisher ad servers used for the sale of open web display advertising space; "ad exchange market" when referring to the market for ad exchanges for transacting indirect open web display advertising space; "ad buying tools for small advertisers" when referring to the market for ad-buying tools for small advertisers for buying open web display advertising space; and "ad buying tools for large advertisers" when referring to the market for ad-buying tools for large advertisers for buying open web display advertising space.

switching costs and raising barriers to entry. Google's experts have not offered any tying-specific procompetitive benefits of Google's tie.

11. Google's engaged in the steering of inventory towards AdX, through the following:

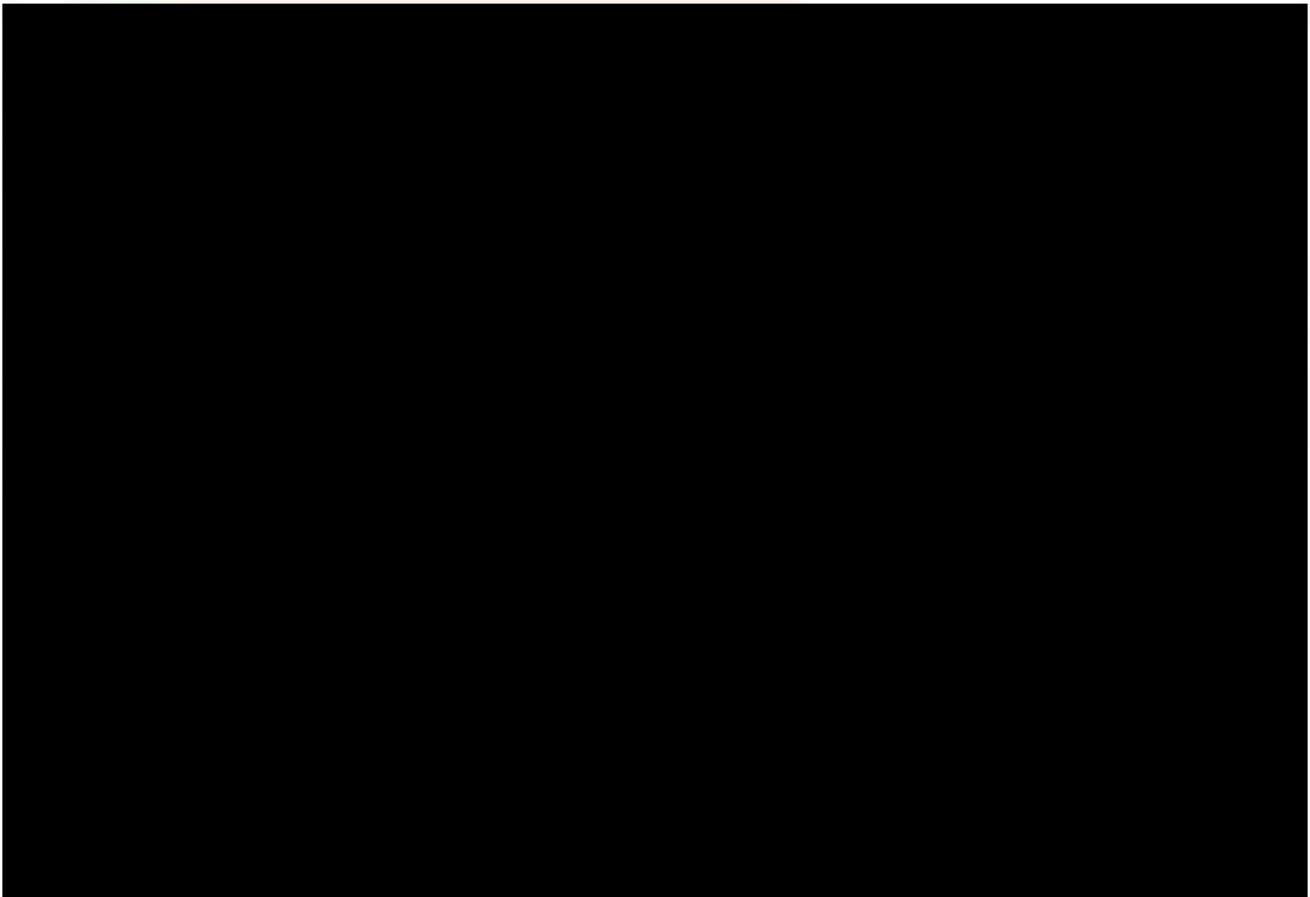
- a. Google's **Unified Pricing Rules ("UPR")**, which harmed competition and enhanced Google's monopoly power in the relevant ad exchange market and market for ad buying tools for large advertisers;
- b. Google's **Dynamic Allocation ("DA") and Enhanced Dynamic Allocation ("EDA")**, which harmed competition and enhanced Google's monopoly power in the relevant ad exchange market;
- c. Google's **line item limitations**, which harmed competition and enhanced Google's monopoly power in the relevant ad exchange market; and
- d. Google's **data field redactions**, which harmed competition and enhanced Google's monopoly power in the relevant ad exchange market.

12. Google's engaged in auction manipulations, including:

- a. **Bernanke, Project Bernanke, and Global Bernanke**, which harmed competition and enhanced Google's monopoly power in the relevant market for ad buying tools for small advertisers and ad exchange market; and
- b. **Dynamic Revenue Share ("DRS")**, which harmed competition and enhanced Google's monopoly power in the relevant ad exchange market.

13. Google's other actions, including Google's Project Poirot and Facebook agreement, were aimed at limiting Header Bidding, harmed innovation, and reinforced Google's pattern of anti-competitive conduct.

14. My opinions, based on my application of accepted economic methodologies to the evidence in this case, are further summarized in the chart below:

Table 1

15. Several of Defendant Google’s experts (“Google’s Experts”), including Professors Michael Baye, Anindya Ghose, Paul Milgrom, Martin Rinard, and Itamar Simonson, have presented opinions responding to my Opening Report. The responsive opinions by Google’s Experts do not undermine my approach or opinions. Rather, their reports misstate methodological requirements and my opinions and are themselves methodologically flawed. I summarize several of the major issues in the reports of Google’s Experts below.

2. Methodological Problems with Professor Baye’s Opinions

16. In response to the market definitions in my Opening Report, Professor Baye opines that the relevant market, in this case, is “a multisided transaction platform for matched display ad impressions.”¹⁰ Professor Baye suggests that this relevant market is a single transaction platform comprising ad servers, ad exchanges, and ad-buying tools. A transaction platform is a multisided platform where services are jointly and simultaneously used in fixed proportions.¹¹ A transactions platform does not exist when “for any distinct

¹⁰ Baye Report, ¶70.

¹¹ Salop, Steven, Daniel Francis, Lauren Sillman, Michael Spero. “Rebuilding Platform Antitrust: Moving on from Ohio v. American Express.” *Antitrust Law Journal* 84, 883 (2022): 902. (“where merchants and cardholders use the platform’s payment

group, substitutes exist that demonstrate the existence of markets that are not composed of multisided businesses serving these distinct user groups.”¹² Under this accepted definition, only ad exchanges arguably meet the definition of a multisided transaction platform, and I have evaluated the relevant ad exchange market as such. Other distinct products or tools, such as ad servers and ad buying tools for small and large advertisers, are not multisided transaction platforms. They do not perform direct transactions between two distinct user groups; rather they serve independent customer groups (i.e., publisher ad servers serve publishers; ad buying tools serve advertisers). They provide multiple services other than facilitate transactions. For example, ad servers enable real-time decisions about serving ads on a publisher website or platform; manage and sell publishers’ ad inventory; offer targeting capabilities to help publishers identify specific audience segments; provide data collection and reports on ad performance. Similarly, ad buying tools offer more functionalities than facilitating transactions. Advertisers use ad buying tools to optimize their targeting, manage their campaign budget, and track metrics around campaign performance. Moreover, ad servers and ad buying tools compete with many products that are also not transaction platforms.

17. A single market, put forth by Professor Baye, obscures the important economic relations needed to evaluate the claims in this case and renders Google’s market power nontransparent.¹³ In this case, publishers face different competitive conditions and can turn to different substitutes and products than advertisers. Lumping both sets of consumers (advertisers and publishers) into a single market and combining substitute and non-substitute products violates standard principles of market definition.¹⁴ For example, publishers buy ad server tools that perform several services beyond facilitating transactions, and both Professor Baye and I agree that the substitutes for these tools are largely building an in-house ad server. We disagree on whether in-house ad servers can prevent an exercise of market power by a hypothetical monopolist, but we agree that in-house ad servers are not a substitute advertisers can turn to. As a result, ad servers are a separate market and should not be combined with tools advertisers use, such as Google Ads.

18. Professor Baye does not conduct any of the requisite market definition tests to define his transactions market. He does not explain why this market is appropriate for analyzing the alleged anti-

services jointly, simultaneously, and in fixed proportions.”); Hovenkamp, Herbert. “Platforms and the Rule of Reason: The American Express Case.” *Columbia Business Law Review* 35, 54 (2019).

¹² Rose, Nancy and Jonathan Sallet. “Ohio v. American Express: The Exception that should not become the Rule.” *Antitrust* 36, 76 (2022); Wu, Tim. “The American Express Opinion, Tech Platforms & the Rule of Reason.” *The Journal of Antitrust Enforcement*, Forthcoming, (2018): 2. (“transaction platforms can’t provide a service to one side of the market independently.”)

¹³ Rose, Nancy and Jonathan Sallet. “Ohio v. American Express: The Exception that should not become the Rule”, *Antitrust* 36, 76, (2022): 80. (“The problem with defining a transaction platform market is by “[...] too broadly combining distinct user groups, the role of market definition can be distorted to serve as a means of cloaking, not identifying, market power.”)

¹⁴ Katz, Michael, and Jonathan Sallet. “Multisided platforms and antitrust enforcement.” *Yale Law Journal* 127 (2017): 2154. (“The single market approach can also be problematic because competitive conditions may differ on two sides of a platform”); Hovenkamp, Herbert. “Platforms and the Rule of Reason: The American Express Case.” *Columbia Business Law Review* 35, 54 (2019): 81. (describing combining two sides of a platform into a single market as “economic nonsense”).

competitive conduct in this case or how this market can help identify constraints on Google's market power. Professor Baye does not explain who participates in his proposed market or any other important facts about his market. He does claim that Google has a [REDACTED] market share.¹⁵ As I describe later in this report, his market share calculation is riddled with inconsistencies. Critically, his market share calculation treats Google and the proposed competitors' revenues inconsistently. While he only accounts for AdX revenues in the numerator, the numerator applies a broad definition of ad spending across both the ad tech stack and other areas of digital advertising for a variety of competitors, most of which are not identified by name.

19. Professor Baye does not apply any of the Brown Shoe factors in proposing his single "multi-sided transactions platform" market.¹⁶ Nor does he engage in either a qualitative or quantitative HMT analysis. That is, unlike my approach, Professor Baye does not conduct the analyses required to define an alternative relevant market or markets. Professor Baye's unsupported single platform market is instead overbroad and obscures important economic relations.¹⁷ In contrast, evaluating and defining distinct markets that identify substitutes reasonably available to publishers and separately to advertisers, as I have done, is the recommended and accepted approach.¹⁸

20. For the purposes of their rebuttal, Google's Experts replaced my opinion on market definition with a strawman. I defined an advertising buying tools market. Professor Baye, Professor Ghose and Professor Simonson respond that if display advertising increases in cost, then advertisers will substitute to other ad formats.¹⁹ However, ad buying tools can be used for multiple formats. Therefore, ad format switching, to the extent it is recaptured, would not undermine a SSNIP applied to display advertising.²⁰ This is a standard market definition principle. To avoid its implications, Google's Experts critique a relevant market of display advertising rather than my tool-based market.

21. Professor Baye offers empirical calculations that are contaminated by errors. These errors always bias the results in one direction, in favor of Google. A sample of this problem is as follows: (i) aggregating data across time periods obscuring intertemporal market changes; (ii) combining overlapping data sources

¹⁵ Baye Report, ¶70.

¹⁶ Baye Report, ¶184.

¹⁷ Katz, Michael, and Jonathan Sallet. "Multisided platforms and antitrust enforcement." *Yale Law Journal* 127 (2017): 2155. ("The single market approach can also be problematic because competitive conditions may differ on two sides of a platform")

¹⁸ Katz, Michael, and Jonathan Sallet. "Multisided platforms and antitrust enforcement." *Yale Law Journal* 127 (2017): 2154. ("For advertising supported media markets there is broad agreement that defining two, closely linked but distinct markets is preferable to defining a single platform market")

¹⁹ Baye Report, ¶254; Ghose Report, ¶39; Simonson Report, ¶18.

²⁰ Moresi, Serge, Steven Salop, John Woodbury. "Market Definition." *Antitrust Economics for Lawyers* (2017): Chapter 1, Section 4. (Authors provide "general formulas [...] for the uniform SSNIP test and the single-product SSNIP test, respectively, when firms sell multiple products, some inside and some outside the candidate market").

inflating volumes transacted by competitors; (iii) conflating inventory and transaction types, inflating the number of publishers transacting either inventory or via transaction types not in the market defined.

3. Google's Experts Criticisms regarding my Methodology are Unfounded

22. Professor Baye and Professor Milgrom make a number of assertions about my Opening Report that are incorrect and unsubstantiated. They first claim that I did not account for Google's vertical integration along each component of the ad tech stack and the theoretical benefits associated with that integration. My Opening Report not only accounted for Google's vertical integration but also explained how that integration incentivized and explained Google's anti-competitive conduct in this case. In theorizing about the benefits, Professors Baye and Professor Milgrom themselves fail to address the market conditions required for those benefits to potentially arise. One of those conditions is that Google has and continues to have monopoly power in the vertically integrated markets—which runs directly contrary to Professor Baye's other opinions and Google's position in this case. Their theoretical benefits are also either novel and untested or unsubstantiated with any data or documents. Regardless, as I explain below, any integration benefits (even if substantiated) do not justify the anti-competitive conduct in this case, as the at-issue conduct reflects additional choices made by Google independent of its vertical integration.

23. Professor Baye claims I do not account for indirect network effects.²¹ Contrary to Professor Baye's opinions, my Opening Report properly accounted for "indirect network effects," which I define below.²² Specifically, I considered such effects in analyzing, for instance, the ad exchange market and substitution possibilities as they relate to market definition. On the other hand, Professor Baye does not explain or provide what he thinks the supposedly missing network effects are, the evidence for their existence, the mechanism by which they operate, or their magnitude.

24. The concept of "multi-homing," invoked by Professors Baye and Ghose throughout their reports is simply the reality that customers may buy a product from different providers, not unique to the ad tech industry and not indicative of the bounds of a relevant market. Most of the multi-homing claims by Professor Baye are misnomers. It is simply customers using different tools for different purposes. This is

²¹ Baye Report, ¶43.

²² Gans Opening Report, ¶377 ("A barrier to entry exists if an entrant faces higher costs of competing for customers than incumbent providers. Indirect network effects create such entry costs. In this case, it is difficult given Google's market power in adjacent markets for an entrant to gather enough buyers and sellers to obtain sufficient scale. For an individual exchange, indirect network effects emerge when the value buyers is increasing in the number and activity of sellers and vice versa."); Gans Opening Report, ¶383 ("Thus, as more participants join each side of the market for ad exchanges for transacting indirect open web display advertising, the value of an ad exchange grows for both publishers and advertisers, creating indirect network effects."); Gans Opening Report, ¶385 ("The effect of these indirect network effects favoring AdX were well-understood in the industry.")

not multi-homing. Among other omissions, Professors Baye and Ghose do not provide any economic reason or rationale for their assertions that where actual multi-homing exists, it indicates intense competition.

25. Professor Baye and Professor Ghose raise issues concerning my methodology for defining relevant markets. In my Opening Report, I applied standard economic methodologies (Brown Shoe and HMT), to analyze and define four relevant product markets.²³ My analyses were methodologically sound and empirical in nature,²⁴ in that they were evidence-based, as opposed to simply being theoretical or abstract. I relied on my review and observation of data, documentary, and testimonial evidence available in this case. Consistent with a standard and well-established economic approach to defining markets, I provided a basis for the Brown Shoe factors applicable in this context, employed an evidence-based HMT based on the available data, and accounted for substitution, indirect network effects, and vertical integration, among other considerations.

26. In multiple instances, Google's Experts focus on erecting and taking down strawmen opinions that do not exist in my Opening Report:

- a. Contrary to Professor Baye's assertions, my application of HMT does not hinge on a SSNIP causing the loss of "all" customers in a candidate market. Instead, I considered substitution at the margin and that not all consumers have to substitute away for a price increase to be unprofitable. Professors Baye, Ghose, and Simonson opine that advertisers switch between advertising formats and switch from display advertising to another format if the cost of display advertising increases.²⁵ Professor Baye, in turn, asserts that my defined relevant markets, including with respect to ad buying tools, are artificially narrow. However, I defined markets for advertising buying *tools*, and ad buying tools can be used for multiple formats. Specifically, I evaluated and defined a market for ad buying *tools* for small advertisers interested in purchasing display advertisements, consisting of Google Ads and its competitors. I also defined a market for ad buying *tools* for large advertisers interested in purchasing display advertisements, consisting of Google DV360 and its competitors. If advertisers switch

²³ Gans Opening Report, ¶127 ("here are two approaches to achieving the goal of defining relevant markets. A relevant market can be identified using evidence of qualitative market characteristics or practical indicia. In the seminal Brown Shoe case, the U.S. Supreme Court instructed that practical indicia can be used to define a relevant product market"); Gans Opening Report, ¶128 ("The second standard economic method to define relevant product markets is the hypothetical monopolist test (HMT)")

²⁴ Empirical evidence in economics is evidence collected through observation. Non empirical evidence is evidence deduced from theory alone. Empirical evidence includes observations of consumers and industry participants, data concerning costs, prices, output, and consumer and producer behavior. Empirical evidence can be qualitative and quantitative. *See*, Britannica. "empirical evidence" (Undated). Accessed on September 3, 2024. <https://www.britannica.com/topic/empirical-evidence>

²⁵ Baye Report, ¶254; Ghose Report, ¶39; Simonson Report, ¶18.

from display advertising to another ad format, they can do so using Google Ads, DV360 or other tools. This means that simply switching between ad formats does not impact my market definitions, contrary to the opinions of Google's Experts.

- b. Professor Baye refers to my markets as narrow because I focus on open web display advertisements. He never responds to the fact, however, that Google exercises price discrimination in each of the relevant markets that I define, setting separate prices for open web display impressions.²⁶ Google's Experts' efforts to expand the relevant markets conflict with key facts, including: (1) most publishers sell display advertising on the open web and are being competitively injured by Google's market power with respect to their open web transactions, and (2) the conduct in this case primarily concerns open web impressions.

27. With respect to monopoly power, I presented analysis and evidence that show that Google possesses substantial monopoly power in three relevant markets: the ad server market, the ad exchange market, and the market for ad buying tools for small advertisers. I evaluated evidence, including market shares, unique product features, customer switching costs, and barriers to entry. Professor Baye's responsive opinions neither rebut the evidence of Google's monopoly power in the three relevant markets nor support his overarching, conclusory position that "Google does not have monopoly power." As an initial matter, throughout his analysis, Professor Baye conflates his monopoly power challenge with his market definition challenge and the presence of monopoly power with the reasons why Google's monopoly power may exist. Neither conflation undermines my analyses and conclusions that Google possesses monopoly power in the three relevant markets. Contrary to his other responsive opinions:

28. I relied on direct evidence of Google's monopoly power, including evidence that Google's AdX ad exchange has maintained a supra-competitive take rate and increased its market share over time, while AdX competitors have charged lower and reduced their take rates. On the other hand, based on economic principles, the data and documents here, and my calculations, Professor Baye's assertions about output increases, decreased Google prices, and increased quality are incorrect or immaterial and fail to rebut the existence of Google's monopoly power in the relevant markets.

29. I measured Google's market shares in the relevant markets using an accepted approach and available data. Indeed, my market share estimates were conservative and bolstered by deposition testimony.

²⁶ U.S. Department of Justice and the Federal Trade Commission. "Merger Guidelines." (2023): 43. ("If the merged firm could profitably target a subset of customers for changes on prices or other terms, the Agencies may identify relevant markets around those targeted customers.")

I also accounted for third-party ad exchanges and ad buying tools' transactions using my approach. In contrast, Professor Baye's calculations double-count those transactions. My analysis of the third-party data assembled by Professor Baye reinforces my initial conclusions.

30. In addition to measuring market share using available data that align with the observations of the deponents in this case, I analyzed and considered barriers to entry. Considering those barriers and market share reflects an accepted method of measuring and demonstrating monopoly power.²⁷ Professor Baye does not challenge the existence of the barriers to entry from my Opening Report. Professor Ghose's opinions do not refute the empirical evidence that high transaction volumes and large scale of data constitute substantial barriers to entry.

31. With respect to conduct and harm, the evidence in this case shows that Google, in fact, engaged in the tying, UPR, DA and EDA, line item, data-redaction, and auction manipulation conduct at issue in this case. The evidence, thus, refutes Professor Baye's assertions that some of these actions did not occur. Direct evidence of the nature of the conduct, Google's intent, and the resulting effects also refute Professor Baye's and Milgrom's assertions that this conduct was pro-competitive and would have happened in a competitive market.

II. REBUTTAL TO PROFESSOR BAYE AND PROFESSOR MILGROM CONCERNING VERTICAL INTEGRATION, INDIRECT NETWORK EFFECTS, AND MULTI-HOMING

32. Google's Experts, Professors Baye and Milgrom, contend that, in my Opening Report, I did not (1) take into account vertical integration in the assessment of market definition and market power nor the benefits from vertical integration overall; (2) did not consider the role of indirect network effects in the assessment of market definition and market power; and (3) did not consider the role of multi-homing in the assessment of market definition and market power. As explained below, these assertions are false. I do consider indirect network effects, and I also considered what Professor Baye incorrectly refers to as multi-homing.

A. Vertical Integration

33. With respect to open web display advertising, Google operates at each stage in the corresponding ad tech stack. On the buy-side, it offers tools that are used by large and small advertisers (through products including Google Ads and DV360). On the sell-side, it offers ad serving products and tools for publishers

²⁷ See *United States v. Google LLC*, No. 20-CV-3010 (APM), -- F. Supp. 3d --, 2024 WL 3647498, at *66 (D.D.C. Aug. 5, 2024) ("[C]ourts more typically examine market structure in search of circumstantial evidence of monopoly power.' *Id.* Applying this 'structural approach,' a court may infer monopoly power 'from a firm's possession of a dominant share of a relevant market that is protected by entry barriers.'" (quoting *United States v. Microsoft*, 253 F.3d 34, 51 (D.C. Cir. 2001)).

to sell their inventory (or ad space) as impressions through its Google Ad Manager (or GAM, previously Double Click for Publishers or DFP). Finally, it operates an ad exchange (AdX) that mediates bids from the buy-side with inventory and price floors from the sell-side, passing through important matching information through a system of “tags.” Google operates in all four markets under consideration in this matter. Based on generally accepted economic principles, I regard Google as vertically integrated across these four markets.²⁸

34. As I explained in my Opening Report, the fact that Google is vertically integrated is of central importance in this matter.²⁹ This is because, for much of the conduct under examination,³⁰ it is Google’s monopoly power in specific markets that gives it the *ability* to engage in the conduct observed, while its vertical integration gives it the *incentive* to engage in the conduct observed.³¹ For instance, when Google ties a product in one market with that in another, Google’s monopoly power makes it possible to coerce consumers to accept the tie. This impacts the tied market where Google also competes. When Google engages in auction manipulations that alter outcomes in one market, Google captures the benefits in related markets from the result of those manipulations, leading to anti-competitive harm. By virtue of its substantial monopoly power in markets where these manipulations take place, Google captures the benefits in other vertically related markets where it also offers products.

35. Google’s Experts, Professors Baye and Professor Milgrom, do not dispute that Google is vertically integrated.³² Nor do they dispute that, as a result of this vertical integration, Google is incentivized to care about the impact of its actions in one market on the profits it will generate in other vertically-related markets. What they do dispute is whether vertical integration is harmful from an antitrust perspective.

²⁸ Riordan, Michael. “Vertical Integration.” *The New Palgrave Dictionary of Economic*, 2 (2007). (“Vertical integration is the unified ownership and operation of successive production and distribution processes by a single firm”)

²⁹ See Gans Opening Report, ¶19 (“Google has the incentive and ability to engage in this harmful, anti-competitive conduct because of its vertically integrated structure or ownership and control of products along the stack.”); Gans Opening Report, ¶458. (“In each case, I establish that if Google had not had market power in the publisher ad server market and had not been vertically integrated from that market into an adjacent vertical segment (the exchange market), it would have neither had the ability nor the incentive to engage in the conduct described.”) The statements by Google’s Experts otherwise are thus incorrect. See Baye Report, ¶44.

³⁰ This conduct includes tying Google Ads to AdX via technical restrictions, the contractual tie between DFP and AdX, channeling transactions to its exchange and manipulation of the auction run by its buy-side tool for small advertisers and the auction run by its ad exchange to exclude competitors from transacting high-value impressions (see Gans Opening Report, ¶859)

³¹ See Rey, Patrick, Jean Tirole. “A primer on foreclosure.” *Handbook of industrial organization* 3 (2007): 2145-2220; Ordovery, Janusz A., Garth Saloner, and Steven C. Salop. “Equilibrium vertical foreclosure.” *The American Economic Review* (1990): 127-142; Hart, Oliver, Jean Tirole, Dennis W. Carlton, and Oliver E. Williamson. “Vertical integration and market foreclosure.” *Brookings papers on economic activity. Microeconomics*. (1990): 205-286; de Fontenay, Catherine C., and Joshua S. Gans. “Vertical integration in the presence of upstream competition.” *RAND Journal of Economics* (2005): 544-572; Morton, Fiona M. Scott. “Contracts that reference rivals.” *Antitrust* 27, no. 3 (2013); Liu, Fan, David S. Sibley, and Wei Zhao. “Vertical Contracts That Reference Rivals.” *Review of Industrial Organization*. 56, no. 2. (2020): 381-407.

³² For example, Professor Baye repeatedly refers to Google as vertically integrated, despite disputing that Google is integrated across the buy-side, sell-side and exchange markets in open web display advertising for purposes of arguing that these are not separate markets by virtue of Google being vertically integrated, see Baye Report ¶44.

Google's Experts opine that Google is able to generate better short-term outcomes for its customers, disregarding any anti-competitive effects, as a result of the conduct across the vertically integrated markets.

36. The problems with these repeated opinions from Google's Experts regarding the benefits of vertical integration are threefold.

- a. First, the benefits the Google's Experts identify from vertical integration only arise if the vast majority of transactions along the ad tech stack flow through Google; a pre-requisite requirement for which is that Google has substantial market share in multiple vertical markets. However, Professor Baye's other opinions directly conflict with his own claims when he opines that Google has a low market share in each of the three relevant markets. This inconsistency in the opinions of Google's Experts cannot be reconciled as a matter of economics.
- b. Second, Google's Experts provide no evidence showing that the purported benefits of vertical integration have motivated or been part of Google's intent, have been realized in practice, or would not be realized if Google were not vertically integrated. This is another critical omission.
- c. Finally, vertical integration is not the claimed anti-competitive conduct alleged in this case. Although enabled and incentivized by Google's vertical integration, Google's at-issue conduct consists of additional choices made by Google, distinct from its vertical integration. Google's vertical integration did not mandate the claimed anti-competitive conduct, nor can any benefits from vertical integration justify that conduct.

37. In his report, Professor Baye refers two broad textbook benefits ("Professor Baye's Theoretical Benefits"), not specific to Google: (1) Elimination of Double Marginalization and (2) Increased Internal Investment. I discuss both below:

38. Elimination of Double Marginalization ("EDM"): When a firm owns two or more vertically integrated business units, it may set its prices in the two markets based on its profits across those vertically related markets. When the firm (a) has monopoly power in both markets; (b) uses simple linear pricing, and (c) transacts predominantly within its vertically integrated entity, then, in comparison with the case where

the firm is non-integrated, prices may be lower in each market as the firm may eliminate mark-ups for trade between its two units.^{33,34}

39. Increased Internal Investment: For a firm that owns two or more vertically integrated business units, when it undertakes investments that enhance product quality or lower costs in ways that have an impact on market transactions, it may take into account the benefits of these across the vertically related markets. These benefits arise when, in the absence of integration, contracting on those investments is not otherwise possible.³⁵

40. To these, Professor Milgrom adds a set of novel theorems he developed for this case, not present in the academic literature³⁶ that argue that vertical integration can allow a firm, that is integrated throughout the markets in the display advertising stack, to take actions that can mitigate externalities between market participants in one market to the benefits of participants in another market (“Professor Milgrom’s Theoretical Benefits”).

41. As a matter of economics, all of Professor Baye’s and Professor Milgrom’s Theoretical Benefits from vertical integration do not simply or automatically arise but only arise, even theoretically, when other market conditions are met. However, neither expert undertakes any analysis to establish whether those conditions are met, let alone acknowledge that those conditions are required.

³³ Spengler, Joseph J. “Vertical Integration and Antitrust Policy.” *Journal of Political Economy* 50, no.4 (1950): 347-352. (“Of great importance is the conclusion, developed earlier, that in an imperfectly competitive world vertical integration enables the higher-stage producer to evade “monopolistic” surcharges imposed by suppliers in lower stages, thus putting him in a position where he finds it advantageous to ask lower prices than would be asked in the absence of vertical integration and in the presence of horizontal integration.”)

³⁴ Kwoka, John and Margaret Slade. “Second Thoughts on Double Marginalization.” *Antitrust* 34, no.51 (2019): 55-56. (“the classic EDM model is based on a long list of assumptions that do not necessarily hold” [including] “pure monopoly exists both upstream and downstream” [and] “upstream marginal cost becomes the operative transfer price”); Elhauge, Egner. “Tying, Bundled Discounts and the Death of The Single Monopoly Profit Theory.” *Harvard Law Rev.* 123, no.397 (2009) (setting out the requirements for EDM.)

³⁵ In economics, this condition is referred to as non-contractible investments. See the Nobel prize winning work of Williamson, Oliver E. *Markets and Hierarchies: Analysis and Antitrust Implications* New York: Macmillan Publishers (1975); Grossman, Sanford J., and Oliver D. Hart. “The costs and benefits of ownership: A theory of vertical and lateral integration.” *Journal of Political Economy* 94, no. 4 (1986): 691-719; Hart, Oliver, and John Moore. “Property Rights and the Nature of the Firm.” *Journal of Political Economy* 98, no. 6 (1990): 1119-1158; Hart, Oliver, and Bengt Holmstrom. “A theory of firm scope,” *Quarterly Journal of Economics* 125, no. 2 (2010): 483-513.

³⁶ These theorems are novel in that they have not been stated, even as conjectures, by any economist prior to Professor Milgrom in these recent antitrust matters involving Google. In my opinion, Professor Milgrom’s theorems in this case are what would be a ‘first pass’ in a set of conclusions that would then be more fully developed if they were to form an academic contribution. This would include, amongst other things, a full formal statement of assumptions and boundary conditions for each theorem, an exploration of alternative equilibrium concepts, a consideration of which parameters can be considered exogenous and which might be endogenous, and a mapping of the theorems into testable empirical hypotheses that would place those theorems on a path to future empirical investigation and not simply a justification of whether some assumptions are consistent with evidence at hand.

42. As stated above, with respect to the EDM benefit, three conditions are required: the firm (a) has monopoly power in both markets; (b) uses simple linear pricing, and (c) transacts predominantly within its vertically integrated entity.³⁷ I discuss each of these three conditions further below.

43. As to the first EDM condition, the EDM benefit will only arise if the firm has monopoly power in at least two markets because only in this case will a firm have a mark-up in each market, at least one which can possibly be eliminated by vertical integration.³⁸ If one or both markets are competitive, then prices will reflect costs and will not involve a double mark-up that can be eliminated.³⁹ Professor Baye does not acknowledge this first EDM condition of monopoly power across two or more markets and certainly does not claim that Google has monopoly power in the markets in which it operates. Instead, he opines to the contrary, that Google has no monopoly power. However, either (a) EDM is a benefit from vertical integration *and* Google has monopoly power in the respective vertically integrated markets, *or* (b) Google has no monopoly power but also lacks EDM as a benefit from vertical integration. Professor Baye's claims regarding EDM fail a consistency test.

44. The second EDM condition is that the firm uses linear prices in transacting. A linear price is a simple price per unit of output.⁴⁰ In the case of the ad tech stack, there are numerous outputs. Outputs include the features of using tools to help manage inventory and choose bids. Here, however, Google (and others) either charge a flat (monthly) fee or charge an ad valorem rate; that is, not simply a price per impression transacted but instead a percentage of the total revenue transacted. These are not linear prices and hence, are not the prices for which the theory of EDM would apply in the context of vertical integration. In other words, Professor Baye's Theoretical Benefits regarding EDM fail to match the conditions of the industry. Professor Baye does not acknowledge or address this omission in his assertions regarding EDM.

45. The final EDM condition—that the firm transactions are predominantly within the vertically integrated entity—is also a requirement for the two other theoretical benefits posited by Google's Experts. Professor Baye's Theoretical Increased Internal Investment Benefit and Professor Milgrom's Theoretical Benefits. Regarding this condition, a difference exists between simply offering products in two or more vertically integrated markets and transacting primarily within a vertically integrated entity. Specifically, a firm might operate units in two vertically related markets but engage in substantial trade with other entities

³⁷ Spengler, Joseph J. "Vertical Integration and Antitrust Policy." *Journal of Political Economy*, 50, 4 (1950): 347-352. (Lays out the conditions under which vertical integration leads to lower prices and better allocation of resources)

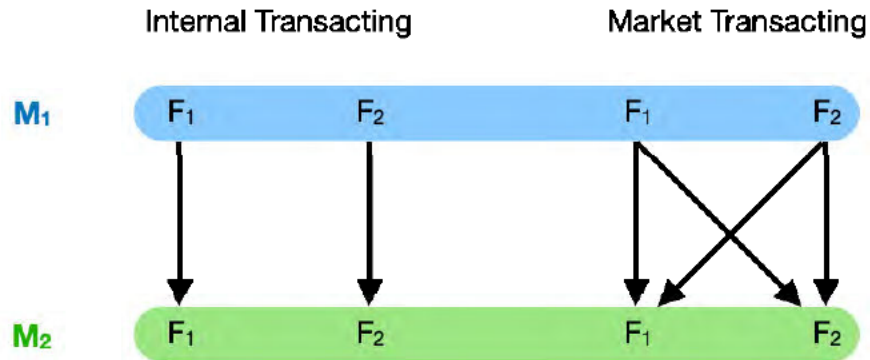
³⁸ Kwoka, John and Margaret Slade, "Second Thoughts on Double Marginalization," *Antitrust*, Vol. 34, No. 2 (2019): 51-56.

³⁹ Spengler, Joseph J. "Vertical Integration and Antitrust Policy." *Journal of Political Economy*, 50, 4 (1950): 347-352. ("Yet, even if this be the case, it will make for higher prices only if the end-product is sold in an imperfectly competitive world.")

⁴⁰ Hart, Oliver, Jean Tirole, Dennis W. Carlton, and Oliver E. Williamson. "Vertical integration and market foreclosure." *Brookings papers on economic activity. Microeconomics* (1990): 205-286.

in those markets. Suppose there are two vertically integrated firms (F_1 and F_2) in each of the two markets (M_1 and M_2).

Figure 1
Illustration of EDM Condition



46. As shown in the illustration above, F_1 and F_2 each have a business unit in each of those markets. The firms are otherwise the same and so each has a 50 percent share of each market. One possibility (Internal Transacting) is that they only transact with their own units, with 100 percent of all transactions occurring through a single firm. Internal Transacting reflects the condition where a firm transacts predominantly within the vertically integrated entity. Another possibility (Market Transacting) is that F_1 and F_2 do not preference their own downstream entity (perhaps because there is downstream differentiation amongst consumers or some other factor). In this case, for each firm, half of their transactions are internal and half are market. This means that only half of all transactions are within an integrated firm. Market Transacting reflects exactly the same pattern of transactions that would arise if the firms were not vertically integrated at all.⁴¹ Therefore, for a vertically integrated firm to care about the profits per transaction more than non-integrated firms, a disproportionate share of transactions must flow internally, similar to Internal Transacting above.

47. Without this internal flow of transactions, the same theoretical benefits do not exist. Specifically, without this internal flow of transactions:

⁴¹ For a formal derivation of this see de Fontenay, Catherine C., and Joshua S. Gans. "Vertical integration in the presence of upstream competition." *RAND Journal of Economics* (2005): 544-572.

- a. Incentives to eliminate double marginalization are muted and potentially non-existent as firms base their own internal transfer prices on the prices they receive by transacting outside of the vertically integrated entity.⁴²
- b. The ability of integration to capture investment returns that would be realized by other firms cannot be realized as those benefits would be unchanged (or the same) relative to the non-integration situation.
- c. A firm engaging in auction conduct designed to impact bidder behavior in other markets would be muted because most of its transactions take place across products and tools that are provided by others.

48. Professor Milgrom does not opine on monopoly power or evaluate the extent of internal transactions as part of his analysis. His theorems assume that all such transactions are internal so that externalities are completely eliminated by the conduct examined. Professor Baye also does not link his theoretical benefits and vertical integration analysis to whether or not the condition of predominant internal transactions is met. Professor Baye, however, does opine that most of Google's transactions along the ad tech stack are not internal but between firms.⁴³ In this regard, he once again undermines his own opinions within the same report. Professor Baye again takes internally inconsistent positions in claiming benefits from vertical integration conditioned on Google's predominant internal transactions, while opining elsewhere that conditions are such that Google's internal transactions are a small portion of the industry when he concludes that Google has low market shares.

49. Illustrating Professor Baye's inconsistency, he opines that: (1) Google's ad buying tools, Google Ads and DV360, accounted for less than 25 percent of US display ads since 2013 (with Google Ads itself being no more than [REDACTED] of the market for buying tools for small advertisers and as low as [REDACTED] [REDACTED]⁴⁴); (2) Google's ad exchange has accounted for between [REDACTED] of US display ads between 2018 and 2022⁴⁵); and (3) Google's share of the ad server market is not as high as I calculated in my Opening Report, but something lower, although he does not opine on what that share would be.⁴⁶ Therefore, under Professor Baye's market share opinions (which I address as incorrect later in this Rebuttal

⁴² Economides, Nicholas, and Steven C. Salop. "Competition and integration among complements, and network market structure." *Journal of Industrial Economics* (1992): 105-123; Gans, Joshua S. "Concentration-based merger tests and vertical market structure." *Journal of Law and Economics* 50, no. 4 (2007): 661-681.

⁴³ Baye Report, ¶423.

⁴⁴ Baye Report, Exhibit 21.

⁴⁵ Baye Report, Exhibit 20.

⁴⁶ Professor Baye only states that Google's ad server market share could be "no greater than [REDACTED]" under some assumptions or "no greater than [REDACTED]" if competition is weaker. See Baye Report, ¶338.

Report), the maximum possible share of transactions across the vertical display ad tech stack that would be internal would be between [REDACTED]. These low levels of internal transactions, according to Professor Baye, undermine his opinion as to the benefits of vertical integration.⁴⁷ My point here is not that there is a low level of internal transactions between Google's vertically integrated entities (my own conclusions indicate that level is high) but to highlight the inconsistency between two arms of Professor Baye's analysis that cannot be reconciled and undermine both arms of analysis. Professor Baye further claims that "76.6 percent of publishers using DFP do not use AdX"⁴⁸ and "the amount transacted monthly by U.S. advertisers on Google Ads through third party exchanges is significant."⁴⁹

50. In summary, while Professor Baye opines on various forms of theoretical vertical integration benefits, he does not examine the market conditions to support those benefits. I have shown that those market conditions are not present, and where they are present (like monopoly power and high levels of internal transactions), Professor Baye inconsistently disclaims them. In other words, he fails to perform a proper, thorough analysis to provide even minimal support for his assertions regarding vertical integration benefits.

51. While the condition of Google's possession of monopoly power in relevant markets (which I analyzed in my Opening Report and Professor Baye disputes) could theoretically generate vertically integrated benefits, my evaluation of the data and documents demonstrate that those benefits have no foundation. Such benefits are also not material in this matter, as I explain in the next subsection.

52. With regard to EDM, I have already explained that Google's pricing does not comport with the pricing structure (namely, linear, per-transaction pricing) that underlies the EDM theory. Professor Baye opines that Google prices are lower than those of non-integrated firms in the market. However, his cited evidence does not stand up to scrutiny. Appendix F shows that many more advertisers use Google Ads

⁴⁷ Both EDM and the Incentives for Investment rely on a high transaction volume flowing through the integrated firm. If the lowest market share in any market for a firm was a percent and the highest share in any market for that firm was b percent, then the maximum fraction of the firm's transactions that were internal would be a/b with $(1-a)/b$ being external. Thus, if r_1 was the vertically integrated firm's profits in the low market share market (market 1) and r_2 was its profits in the high market share market (market 2), then when choosing prices market 1, the firm would maximize $r_1 + (a/b)r_2$ and when choosing prices in market 2, the firm would maximize $(a/b)r_1 + r_2$. The traditional EDM assumptions would presume that all transactions were internal (i.e., $a = b$). However, Professor Baye's claim that Google has a very low market share in some markets implies that a is much smaller than b and, hence, that Google, in setting its prices and other choices, would not place much weight on the interests of its other business units. See O'Brien, Daniel P., and Steven C. Salop. "Competitive effects of partial ownership: Financial interest and corporate control." *Antitrust LJ* 67 (1999): 559; Gans, Joshua S. "Concentration-based merger tests and vertical market structure." *The Journal of Law and Economics* 50, no. 4 (2007): 661-681.

⁴⁸ Baye Report, ¶463.

⁴⁹ Baye Report, ¶467.

compared to DV360 even though Google Ads, which is integrated with AdX and DFP,⁵⁰ has a higher take rate.

53. Regarding Incentives for Internal Investment,⁵¹ Professor Baye identifies investments that Google has made in improving product quality. However, he merely asserts, without proof, that these investments resulted from Google's vertical integration. He does not, however, explain or consider whether a non-integrated entity would make such investments, whether such investments are even associated with vertical integration, whether such investments have been associated with times when Google has engaged in a greater share of internal transactions, or whether those investments would otherwise be non-contractible. Apart from listing investments, Professor Baye does not show that those investments have benefits that are realized in other markets beyond the market where the investments are being made.⁵² Thus, it is merely speculation.

54. Finally, Professors Baye and Milgrom both rationalize that Google, as a vertically integrated entity, undertook auction manipulations and restrictions on auction behavior with the purpose of providing more customer value in other vertically-related markets. These rationales are distinct from Google's goals articulated in its internal documentation. For example, Google redacted key DT file information to prevent publishers from determining advertisers' willingness to pay.⁵³ The rationales now put forward by Professors Baye and Milgrom do not appear in and are absent from Google's own documents. Thus, neither Professor Baye nor Professor Milgrom show that the benefits they alleged were ever intended or realized.

55. As already explained, it is not clear whether Professor Baye claims the benefits that arise from vertical integration occurred or are merely theoretical possibilities. In any case, they do not show empirical evidence to back up their claims. But suppose, contrary to what I have found to be the case, that vertical integration did involve the benefits. They would still be immaterial. This is because the conduct at issue, in this case, is not that Google engaged in vertical integration that harmed competition but that Google's

⁵⁰ Figure 15 shows that less than [REDACTED] of Google Ads display impressions at its peak are transacted outside of AdX while Figure 32 shows that [REDACTED] of DV360 impressions were transacted outside of AdX between 2015 and 2023.

⁵¹ Baye Report, ¶384-390.

⁵² See, for example, Inderst, Roman, and Christian Wey. "Bargaining, mergers, and technology choice in bilaterally oligopolistic industries." *RAND Journal of Economics* (2003): 1-19; de Fontenay, Catherine C., and Joshua S. Gans. "A bargaining perspective on strategic outsourcing and supply competition." *Strategic Management Journal* 29, no. 8 (2008): 819-839. This also applies for exclusive contracts. See Segal, Ilya R., and Michael D. Whinston. "Exclusive contracts and protection of investments." *RAND Journal of Economics* (2000): 603-633; de Fontenay, Catherine C., Joshua S. Gans, and Vivienne Groves. "Exclusivity, competition and the irrelevance of internal investment." *International Journal of Industrial Organization* 28, no. 4 (2010): 336-340.

⁵³ Gans Opening Report, ¶690. ("In a 2019 document, Google employees discuss the changes made to DT files. To the question, "Why do we redact and roun[d] data?" an employee explains, "We want to prevent a publis[her to be] able to determine "these advertisers were will[ing to pay] this much for that user's impression." See GOOG-NE-04599495 at -495. "1P Bid Data Transfer Balancing transparency to publishers, with protecting buyer data and user privacy" (undated). Internal Google document.")

vertical integration, regardless of the theoretical benefits and reasons behind it, enabled and motivated other conduct at hand that, then, generated anti-competitive harm.

56. In summary, Google's vertical integration created incentives for Google's anti-competitive conduct, but is not the anti-competitive conduct Plaintiffs allege in this case. Google's Experts speculate without evidence that Google's vertical integration has been beneficial. Their conjecture is irrelevant because any such benefits do not justify the specific anti-competitive conduct alleged.

B. Indirect Network Effects

57. "Indirect network effects" is another term that Professor Baye frequently invokes in his report.⁵⁴ A product generates a direct network effect when its greater use by customers increases its value to other customers in the same set or class. A product generates an indirect network effect when its greater use by one set (or class) of customers, increases the activity of a distinct set (or class) of customers, which, in turn, raises the value of products in the original market. I used the concept in one part of my Opening Report.⁵⁵

A barrier to entry exists if an entrant faces higher costs of competing for customers than incumbent providers. Indirect network effects create such entry costs. In this case, it is difficult given Google's market power in adjacent markets for an entrant to gather enough buyers and sellers to obtain sufficient scale. For an individual exchange, indirect network effects emerge when the value of access to buyers is increasing the number and activity of sellers and vice versa.⁵⁶

58. With respect specifically to industries that match buyers and sellers, in my Opening Report, I explained that such indirect network effects arose and were studied by the Nobel laureate economist, Al Roth, when he highlighted the desirability of liquidity, there being many active buyers and sellers, in such markets.⁵⁷ I explained that, for the matching of advertising impressions, there are benefits from liquidity,

⁵⁴ Baye Report, ¶275, ¶282, ¶349, ¶373.

⁵⁵ Gans Opening Report, ¶383 ("Thus, as more participants join each side of the market for ad exchanges for transacting indirect open web display advertising, the value of an ad exchange grows for both publishers and advertisers, creating indirect network effects. This can raise the level minimum efficient scale at which new entrants can achieve post-entry profit. In order to operate efficiently, a new entrant must have sufficient advertiser demand to attract publishers, and sufficient publisher inventory to attract advertisers."); ¶389 ("Higher match rates, broader reach, and high-paying ads make an established ad exchange more attractive to both types of participants, reinforcing the network effects. A new exchange without a large customer base on each side of the market would need time and investment to accumulate a high enough customer base to compete. For this reason, network effects in the market for ad exchanges for transacting indirect open web display advertising create barriers for new entrants.")

⁵⁶ Gans Opening Report, ¶344. Gans Errata to ¶377 (correcting the text of the last sentence in the paragraph).

⁵⁷ Gans Opening Report, ¶31. ("On Roth's first criteria of "thickness," an industry operates more efficiently when underlying transactions take place in thick environments; that is, when there are many buyers and sellers. For online advertising, this means that publishers want many potential advertisers to consider bidding for their space while advertisers want many possible publisher spaces for which to bid. Thickness is a particular challenge in the advertising industry because there may not be many ideal advertisers (and hence bidders for ad space) for a particular consumer of the publisher. However, as long as it is relatively frictionless for advertisers to bid for particular consumers' attention, the diversity of advertisers themselves can create a greater level of thickness. For instance, while there may only be a few advertisers who want to sell something to a consumer right now,

i.e., more buyers and sellers actively wanting to place ads and serve ads. This is because liquidity can raise the probability of appropriate matches being found. When those probabilities are exchange-specific, the network effects are confined to those participating in that exchange. However, if there were tools that allow buyers and sellers to bid and transact easily across multiple exchanges, indirect network effects could arise at a market level. From a social welfare perspective, it is better to structure an industry so that indirect network effects are realized at a market level rather than confined to one firm.⁵⁸ I noted that in the open web display advertising industry, due to the lack of neutrality offered by buy and sell-side tools, the indirect network effects manifested at the exchange level, and so constituted an entry barrier for new ad exchanges. I opined that this, amongst other factors, was the reason why AdX, as the exchange with the highest liquidity, had monopoly power in the ad exchange market.

59. Professor Baye opines that I do not take into account indirect network effects. This is not correct.^{59,60} In the section on market definition below, I consider Professor Baye's claims that indirect network effects guide market definition in this matter and are misguided.

60. For example, in my Opening Report, I explained that the AdX take rate should be analyzed like a transaction tax.⁶¹ The incidence, or who pays what portion of a take rate increase, depends on the supply

there may be many advertisers — called brand advertisers — who are just interested in providing more general and less time-sensitive information to consumers. Thus, the diversity of advertisers increases the thickness of online display advertising auctions. Similarly, for advertisers looking to bid for the attention of a given consumer, if there is sufficient information about the set of websites a consumer may visit over a period of time, then advertisers have more options of where to place their ad for that consumer.”); See Roth, Alvin E. “What have we learned from market design?” *Economic Journal* 118, no. 527 (2008): 286.

⁵⁸ See, for example, Farrell, Joseph. “Coordination and lock-in: competition with switching costs and network effects.” *Handbook of Industrial Organization* (2007); Amir, Rabah, Igor Evstigneev, and Adriana Gama. “Oligopoly with network effects: firm-specific versus single network.” *Economic Theory* 71, no. 3 (2021): 1203-1230.

⁵⁹ Baye Report, ¶43.

⁶⁰ However, it is unclear in reading his report whether he is considering indirect network effects that operate in ways other than at the exchange level that I addressed. If so, Professor Baye does not tell us what these indirect network effects are, their strength or how they work. He merely asserts, for example, that if a hypothetical monopolist that owned ad servers attempted a small price increase, feedback from advertisers might make the move unprofitable. He never asserts that this is the case, let alone proves it is the case. He merely says I did not account for this possibility. Professor Baye's assertion is simply false. I do account for indirect network effects but judge them to be irrelevantly small or non-existent in this particular area. For example, if a hypothetical ad server monopolist imposed a small price increase, publishers would not reduce their inventory of display ads by shifting to a subscription-based business strategy or build their own ad servers. The economic incentives would not motivate such a move, and Professor Baye does not show that such moves make any economic sense. However, if there is no reduction in display advertising inventory, there will be no indirect network effect from advertisers. The same is true with the other direction; if advertisers switch away from display advertising, publisher revenue declines, but the quantity of display ads will not change if publisher supply is inelastic. See Katz, Michael, and Jonathan Sallet. “Multisided Platforms and Antitrust Enforcement.” *Yale Law Journal* 127 (2018): 2154. (“For advertising-supported media markets there is broad agreement that defining two, closely linked but distinct markets is preferable to defining a single platform market”)

⁶¹ Gans Opening Report, ¶887. (“Google's AdX take rate is structured like a tax. For example, if a demand-side platform or DSP pays AdX [redacted] for an impression, AdX keeps [redacted], and pays the publisher [redacted]. The burden of the tax depends on the elasticities of demand and supply. It is likely that both publishers and advertisers will bear some of the burden of the take rate. However, because in my judgment, publishers face quite limited options (elasticity of supply) for the sale of their open web display impressions, they likely pay a greater share of the AdX take rate.”)

elasticity of the publishers and the demand elasticity of the advertisers.⁶² These elasticities, in turn, are a function of how easily publishers and advertisers can substitute away from the price increase. If advertisers have numerous substitutes, as Google's Expert Professor Ghose opines, it merely means that any increase in the take rate would be paid by the publishers.⁶³ To conclude otherwise would require that Professor Ghose demonstrate that publishers can substitute to other methods to sell their display inventory. However, Professor Ghose makes no serious claim that publishers have any ability to defect to other methods to sell their display inventory if there is a take rate increase above competitive levels. It is also revealing that Professor Simonson was not asked to survey publishers.

61. This means that even if the market for small advertising tools was fully competitive, a proposition that I dispute below, Google could still exercise market power against the publishers. For example, suppose that advertisers are not willing to pay above [REDACTED] for an open-web display ad impression. Suppose further that AdX raises its take rate by [REDACTED]. The average AdX take rate is approximately [REDACTED]. The [REDACTED] increase translates to a take rate of [REDACTED] ([REDACTED]). At the old take rate, an advertiser's bid of [REDACTED] translated into a [REDACTED] payout to the publishers. If the advertiser paid the additional take rate charge, then its bid would be [REDACTED] to the publishers. To obtain the same impressions as before, the bid would have to increase to [REDACTED].⁶⁴ But advertisers will switch in response to an increase in the take rate above [REDACTED]. However, publishers cannot obtain [REDACTED] from any other option. This means that the publishers would accept [REDACTED], and there would be a transfer of surplus from the publishers to Google.

62. An example of the confusion that can result from employing a single market across the vertical chain of the display ad tech stack in this case can be illustrated by Professor Ghose's pathway analysis.⁶⁵ This is summarized in his Table 2, reproduced below.

⁶² Nicholson, Walter. *Microeconomic Theory: Basic Principles and Extensions*. 9th ed., Thomson/South-Western (2005): 322. ($\frac{e_s}{e_s - e_d}$).

⁶³ Gans Opening Report, ¶132. ("What this indicates is that, as a practical matter of implementing the HMT, it is sufficient to find a lack of substitutes for a given product on only one side of the market. Ad tech tools facilitate the advertising transaction between publishers and advertisers. As long as one side of the market (i.e., the advertiser-side or the publisher-side) has limited substitutes for a given ad tech product, a hypothetical monopolist could profitably impose a SSNIP or an equivalent reduction in quality to that one side."); See also, Gans Opening Report, ¶887. ("Google's AdX take rate is structured like a tax. For example, if a demand-side platform or DSP pays AdX [REDACTED] for an impression, AdX keeps [REDACTED], and pays the publisher [REDACTED]. The burden of the tax depends on the elasticities of demand and supply. It is likely that both publishers and advertisers will bear some of the burden of the take rate. However, because in my judgment, publishers face quite limited options (elasticity of supply) for the sale of their open web display impressions, they likely pay a greater share of the AdX take rate.")

⁶⁴ Robin Lee Report in the US v. Google. GOOG-AT-MDL-C-000019273 at -360.

⁶⁵ Ghose Report, Section VIII.

Table 2
Ghose's summary table of the examples of different pathways of display ad transactions⁶⁶

1	Advertiser	Self-Service Platform*			Publisher
2	Advertiser	Publisher Ad Server [<i>Direct Deals</i>]**			Publisher
3	Advertiser	Ad Network*			Publisher
4	Advertiser	Ad Network		Publisher Ad Server	Publisher
5	Advertiser	DSP / Ad Network	Ad Exchange / SSP	Publisher Ad Server	Publisher
6	Advertiser	DSP / Ad Network	Ad Exchange / SSP through Header Bidding	Publisher Ad Server	Publisher
7	Advertiser	DSP / Ad Network	Ad Exchange / SSP*		Publisher
8	Advertiser	Supply Path Optimization with Ad Exchange / SSP		Publisher Ad Server	Publisher
9	Advertiser	Supply Path Optimization with DSP		Publisher Ad Server	Publisher

* In the case of this transaction path, this tool would also perform the ad serving function.
** In some cases, this path can also involve negotiation that takes place via a DSP and SSP.

63. In paths 2, 4, 5, 6, 7, 8, and 9 publishers and/or advertisers have no choice but to use one or more tools that belong to the markets I define. In those paths, publishers have almost no choice but to use GAM because option 1 and 3 are not reasonable substitutes for publishers. This demonstrates the indispensable role of these products. For these paths, Google's opinion is analogous to that of a monopolist ride-share company arguing that there are many routes to get to a destination once you get in the car. However, the user would still need to use the same car.

64. In paths 1 and 3, impressions do not transact through any of the tools I outline in the relevant product markets. As I analyzed and demonstrated in my Opening Report, none of these paths are substitutes to the other pathways, and accordingly I properly excluded them from the relevant product markets. In Path 1, publishers are Walled Garden Publishers (i.e., Meta, Amazon, etc.) using in-house tools to monetize their own and operated properties. As I demonstrated in my Opening Report, in-house tools are not substitutes

⁶⁶ Ghose Report, Table 2.

to ad servers.⁶⁷ This is because, in the case of a small increase in the price of publisher ad servers: (1) in-house tools would not enable publishers to monetize their web display inventory; and (2) open web publishers could not substitute their inventory supply to social media ads or retailer platform ads. In Path 3, publishers and advertisers transact through an ad network. As I demonstrated in my Opening Report, ad networks are not substitutes for ad exchanges.⁶⁸ This is because ad networks have different characteristics, price structures and levels, and target different customers. Contrary to the approach of Professor Baye, I used standard economic methods to evaluate and define relevant markets and study market power in these markets.⁶⁹

65. Professor Baye also claims that indirect network effects constrain Google's ability to exercise monopoly power (although I note that he does not opine that they constrain Google's possession of monopoly power).⁷⁰ He opines that "Google has an economic incentive to ensure the satisfaction of its customer base because it internalizes externalities across its ad tech stack, and the environment in which it sets fees is subject to indirect network effects."⁷¹ This is the same opinion he held with respect to vertical integration that remains immaterial because, while vertical integration may allow Google to internalize indirect network effects, that theoretical benefit does change the fact that vertical integration, regardless of the reason behind it, has incentivized Google's other, at-issue conduct.⁷²

66. In summary, my Opening Report properly accounted for indirect network effects in my analysis of market definition and market power. Professor Baye's opinions, to the contrary, are incorrect, and much of his analysis is simply irrelevant to the conduct at issue in this case.

C. Multi-homing

67. "Multi-homing" is another term used repeatedly by Professors Baye and Ghose. It appears that, in *their* view:

- a. Multi-homing arises whenever a particular customer purchases a product or service from more than one provider.⁷³

⁶⁷ Gans Opening Report, Section IV.C.3.

⁶⁸ Gans Opening Report, Section IV.D.4.

⁶⁹ Moreover, Professor Baye opines that when considering a multi-sided market for display ad transactions in the United States, Google's market share has declined from over 41 percent in 2014 to about 25 percent in recent years. *See* Baye Report, ¶359. However, this is misleading as Professor Baye includes non-display transactions such as YouTube revenues and Facebook revenues.

⁷⁰ Baye Report, ¶350.

⁷¹ Baye Report, ¶349.

⁷² Here, however, Professor Baye adds that "raising prices can cause reputational harm that can negatively affect sales of Google's ad tech products within its current and potential customer base." This statement, however, has nothing to do with "indirect network effects."

⁷³ *See* Baye Report, ¶26.

- b. For those customers who “multi-home,” the cost of switching their purchases between providers is arguably lower than those for customers who only purchase from a single provider (i.e., they single-home).
- c. Multi-homing “is inconsistent with Plaintiffs’ (and their experts’) claims that Google has stifled competition in ad tech.”⁷⁴
- d. Based on a straightforward reading of their opinions, multi-homing is an indicator of intense competition.

68. There is, however, no economic reason, nor have Professors Baye or Ghose provided one, to presume that there is such an association between multi-homing and intense competition. For instance, when there are constraints that make multi-homing costly (such as minimum spends, subscription fees independent of use or switching costs), then firms would have to compete “for the customer” rather than “for the customer’s spend” at the margin. So long as the factors that make multi-homing costly are symmetric (that is, operate in both directions or are not already in place due to incumbency advantages), constraints on multi-homing (leading to more single-homing) could *instead* be an indicator of intense competition. By contrast, Professors Baye’s and Ghose’s opinions that competition is at the margin due to multi-homing imply that competition is necessarily intense.⁷⁵

69. Professor Baye invokes “multi-homing” to support other unsubstantiated opinions that have no clear economic logic. For instance, he states: “[t]he implication of widespread multi-homing and cross visitation is that market shares overstate Google’s competitive significance and understate the significance of Google’s rivals.”⁷⁶ Here, the suggestion is that Google’s customers spend most of their budget on Google products (leading to their high market share), but, despite this, Google could easily lose that high market share in competition with rivals.⁷⁷ However, this misses the point that Google’s high market share indicates that it is already able to win in competition with rivals, and those advantages should be considered when

⁷⁴ Baye Report, ¶26.

⁷⁵ The ambiguous relationship between multi-homing and competition arises persistently in the academic literature. *See, for example*, Gabszewicz, Jean J., and Xavier Wauthy. “Two-sided markets and price competition with multi-homing.” LIDAM Discussion Papers CORE 2004030, CORE (2004); Jeitschko, Thomas D., and Mark J. Tremblay. “Platform competition with endogenous homing.” *International Economic Review* 61, no. 3 (2020): 1281-1305; Abrantes-Metz, Rosa M., and Albert Metz. “Modeling the Dynamics of Network Entry and Competition Under Single-and Multi-Homing.” *Available at SSRN 3862805* (2021); Garcia Pires, Armando J. “Content Provision in the Media Market with Single-Homing and Multi-Homing Consumers.” *Review of Network Economics* 19, no. 1 (2020): 43-83; Evensen, Charlotte B., and Atle Haugen. “The impact of targeting technologies and consumer multi-homing on digital platform competition.” *NHH Dept. of Economics Discussion Paper* 13 (2021); Haan, Marco A., Gijsbert Zwart, and Nannette Stoffers. “Choosing your battles: endogenous multihoming and platform competition.” *TILEC Discussion Paper No. DP2021-011* (2021).

⁷⁶ Baye Report, ¶55.

⁷⁷ Baye Report, ¶58, ¶63.

evaluating Google's monopoly power. Moreover, there is no reason why multi-homing would overstate Google's market share and by implication, understate those of Google's rivals. Rivals would remain just as vulnerable. Finally, as I analyzed in my Opening Report, there is no evidence that small changes in Google's terms or prices resulted in large movements of market share away from Google.

70. When he considers market definition, Professor Baye adopts a broader definition of "multi-homing." There, he opines that when defining a set of products upon which to perform a SSNIP (the "inside" products), customers may also buy products "outside" of that set. He refers to this as multi-homing. Thus, in Professor Baye's market definition discussion, multi-homing is not simply purchasing the same type of products from different providers but purchasing more than one different product from the same or different providers. This is an incorrect definition of multi-homing. For instance, consumers might have more than one game console (e.g., Nintendo and Sony PlayStation) which is legitimately multi-homing. By contrast, when they have a PlayStation 5 and a PlayStation Portable it would be incorrect to call that multi-homing. In the literature, multi-homing involves a customer purchasing the same type of product from different providers.⁷⁸ Obviously, everyone buys different products from different sellers. However, this is not relevant for market power or market definition because it does not establish the ability to substitute between sellers of the same product.

71. In summary, the opinions of Professors Baye and Ghose as to "multi-homing" are not grounded in economic principles, logic, or literature, and do not change my analysis and opinions in this case.

III. MARKET DEFINITION

72. In my Opening Report, I opined that there are four markets that pertain to this case: the market for publisher ad servers used for the sale of open web display inventory, the market for ad exchanges for transacting indirect open web display advertising, the market for ad buying tools for small advertisers for buying open web display advertising space, and the market for large advertisers for buying open web display advertising space. I found that Google had market power in the first three of these markets. Nothing offered by Google's Experts has caused me to revise my opinion on these matters.

⁷⁸ This has been the definition of multi-homing that I have adopted in the literature on advertising markets (e.g., Anderson, Simon P., and Jean J. Gabszewicz. "The media and advertising: a tale of two-sided markets." *Handbook of the Economics of Art and Culture* 1 (2006): 567-614; Ambrus, Attila, Emilio Calvano, and Markus Reisinger. "Either or both competition: A "two-sided" theory of advertising with overlapping viewerships." *American Economic Journal: Microeconomics* 8, no. 3 (2016): 189-222; and Anderson, Simon P., Øystein Foros, and Hans Jarle Kind. "The importance of consumer multihoming (joint purchases) for market performance: Mergers and entry in media markets" *Journal of Economics & Management Strategy* 28, no. 1 (2019): 125-137; Athey, Susan, Emilio Calvano, and Joshua S. Gans. "The impact of consumer multi-homing on advertising markets and media competition." *Management Science* 64, no. 4 (2018): 1574-1590; Bryan, Kevin A., and Joshua S. Gans. "A theory of multihoming in rideshare competition." *Journal of Economics & Management Strategy* 28, no. 1 (2019): 89-96.

A. My Market Definition Methodologies are Generally Accepted Approaches

73. I employed two standard methodologies to define the relevant markets in this case. The first was to consider the practical indicia identified by the Supreme Court in the *Brown Shoe* case that aids in establishing what products are sufficiently strong substitutes to be included in the relevant market.^{79,80} Second, I employ the hypothetical monopolist test along with empirical data to identify reasonable substitutes. Here, I address Professor Baye's criticisms of my application by first recalling that market definition is purposive and depends on the conduct at question in the matter. Then, I review my application of these standard methodologies and respond to Professor Baye's criticisms. I then turn to specific issues raised for each market I analyzed.

1. Market definition is purposive

74. It is important to recall the purpose of market definition in antitrust matters. As I discussed in my Opening Report,⁸¹ the task of identifying relevant markets is undertaken in antitrust analysis in order to assemble the evidence concerning what constrains a firm (or firms) alleged conduct under investigation. In an economy replete with interrelated factors, the goal is to focus on the first-order impact of conduct on competition and economic efficiency and to bind the scope of harm to those directly affected by that conduct. This implies that the natural process by which markets are defined begins with what the conduct is and how this relates to specific acts of the firm engaging in the conduct. Then, it asks who would constrain either that conduct or its effects. Therefore, if we were examining conduct by a firm that produced apples and oranges (say, an allegation of predatory pricing for apples but not oranges), we would start by considering who constrained the firm in its pricing (and non-price options) with respect to apples and if this

⁷⁹ *Brown Shoe Co., Inc. v. United States*, 370 U.S. 294, 1962. ("The boundaries of such a submarket may be determined by examining such practical indicia as industry or public recognition of the submarket as a separate economic entity, the product's peculiar characteristics and uses, unique production facilities, distinct customers, distinct prices, sensitivity to price changes, and specialized vendors.")

⁸⁰ Pleatsikas and Teece suggest that analysis of *Brown Shoe* factors are ill-suited for high technology markets because such markets are often highly differentiated and vulnerable to upheaval due to innovation. See Pleatsikas, Christopher, and David Teece. "The analysis of market definition and market power in the context of rapid innovation." *International Journal of Industrial Organization* 19, no.5 (2001): 665-693, 671. ("In U.S. antitrust jurisprudence, there are two main categories of traditional indicia commonly used to define markets and derive measures of market power. These are (1) the methods contained in the Horizontal Merger Guidelines and (2) indicia that roughly correspond to those identified in *Brown Shoe*. These have been utilized by the courts as if they are universally applicable, without regard to industry context. Unfortunately, context is extremely important, and these indicia, particularly the *Brown Shoe* indicia, are not well-suited for analysis of high technology industries."). These conditions do not apply in the context of the Display Advertising Markets I have delineated, for example Ad Exchanges are not highly differentiated from one another and compete against one another to win the same impressions.

⁸¹ Gans Opening Report, ¶121. ("The first step in the standard approach to analyzing anti-competitive conduct for the purposes of antitrust analysis is to identify and define the relevant markets for examination. This allows for the identification of the areas to test whether examined conduct gives rise to anti-competitive effects, in the form of higher prices or lower product quality compared to competitive outcomes. Even though such conduct can occur within a broad economic system with many interrelationships, potential first-order effects of the conduct can be identified and understood by identifying the markets where those effects are likely to occur.")

were found to be primarily other apple producers, we would not need to continue to broaden the scope of inquiry to consider the suppliers of oranges as well.

75. In this case, there are three classes of conduct alleged to be anti-competitive, all of which were directed at the open web advertising display technical stack. Each involved distinct product choices and terms offered to specific customer classes (e.g., open web display advertisers and open web publishers) and did not directly involve the many other products that Google sold. Thus, the conduct leads an economist to start with the ad tech stack around transacting advertising matches on the open web and to conducts impacting directly on particular products in that stack offered and purchased by particular customers.

76. A natural starting point for identifying relevant markets for an antitrust analysis is the conduct and the products and customers to which the conduct is related. The first step is to examine what options each group of customers has when faced with particular conduct, that is, the competitive options concerning the products in question. The purpose of the *Brown Shoe* factors is to understand whether that starting point makes sense. Are the products clearly defined with specific prices and production facilities that can be identified as distinct? Or are there issues that make that difficult? In relation to the apple grower example, we might start with the particular apples grown by the firm in question (say Macintosh), but note that those apples are sold by retailers who put them side-by-side with different types of apples and that consumers, when faced with a higher price for Macintosh apples than others, tend to switch to the cheaper option. In that case, a narrowly defined market of Macintosh apple suppliers would not be appropriate, and it could be argued that industry experts, as well as consumers, considered apples as a class of fruit rather than particular varieties. That is, the evidence might show that people and other industry participants (e.g., retailers) think about apples in general; apples generally are appealing to consumers in similar ways even if they come in distinct varieties, apple growers can typically grow different apple varieties, there is no identifiable Macintosh customer class, Macintosh apple pricing is typically based off pricing of apples in general, as noted earlier, consumers will switch with price changes and finally, there are no, say, stores that only stock Macintosh apples.⁸² Moreover, even if one or more of these factors was either not relevant or did not apply (for instance, there may be no distinct apple stores that didn't sell oranges), this does not mean that on the combined basis of that evidence that the relevant market is something other than the market for apples while there isn't a market for Macintosh apples.

77. The *Brown Shoe* factors are a way of organizing what might be termed 'qualitative' evidence on what a relevant market is. In order to evaluate, say, how sensitive consumers are to price changes, a deeper

⁸² For the avoidance of doubt, I am not claiming here that I have conducted an investigation of pricing of apples or oranges but instead am using what might be reasonably inferred from common experience to illustrate a broader point.

exploration might be warranted. In particular, there may be other substitution possibilities for apple customers that might widen the scope of who provides a competitive constraint on our lone Macintosh apple producer who is under investigation.

78. As a way of organizing the empirical evidence on such substitution possibilities, a Hypothetical Monopolist Test (HMT) can be deployed. This test focuses on the likely behavior of market participants.⁸³ This test conducts a thought experiment with a premise -- what if all apple producers were colluding with one another and were maximizing joint profits -- and a consequence -- could they profitably increase prices by a small but significant amount in a sustained way above competitive levels and increase their profits? The dual of this question is to what extent would they be constrained by apple consumers substituting away to purchase, say, oranges? If the answer is that very few apple consumers would purchase oranges instead, we can conclude that the price rise would be profitable for the hypothetical monopolist as they would make up higher margins on only a modest reduction in sales.⁸⁴ If the answer is that many apple consumers would purchase oranges, we can conclude that the price rise would not be profitable for the hypothetical monopolist as they would lose sales in a higher volume than would be made up for by earning higher margins on the remainder. In the first case, we would have evidence that the market for apples did not extend beyond apples to include, say, oranges. In the second case, depending on where the substitution occurred, we would redefine our set of suppliers under investigation, perhaps to include orange growers, and then perform the HMT on that broader set. It is this iterative process that then leads us to what the relevant market to assess that particular firm's conduct is.

79. I recount these ways of considering the empirical evidence with the notion of arriving at a definition of relevant markets because Professor Baye takes issue with both my application of the Brown Shoe factors as well as my application of the HMT. I do this because not only was my application appropriate in proposing an alternative relevant market, but Professor Baye conducted no analysis based on either Brown Shoe factors, the HMT, or anything else other than making a vague alternative market definition proposal.

⁸³ U.S. Department of Justice and the Federal Trade Commission. "Merger Guidelines" (2023): 41. ("the HMT asks whether a hypothetical profit-maximizing firm, not prevented by regulation from worsening terms, that was the only present and future group of products ("hypothetical monopolist") likely would undertake at least a small but significant and non-transitory increase in price ("SSNIP") or other worsening of terms ("SSNIPT") for at least one seller of a product in the group."); Coate, Malcom B., Jeffrey H. Fischer. "A Practical Guide to the Hypothetical Monopolist Test for Market Definition." *Journal of Competition Law and Economics* 4 (2008): 10131-1035. ("The SSNIP will generally be a price increase of 5 percent from the current competitive price, lasting for the foreseeable future"). Moreover, it is the regular practice at the FTC to use qualitative data in implementing the HMT.

⁸⁴ Professor Baye seems to misunderstand this aspect of the HMT when he writes "For example, a SSNIP imposed by a hypothetical monopolist of lawn care services in Plano, TX might be unprofitable because it is constrained by the fact that a small but significant number of Plano property owners would respond to the higher price by replacing grass lawns with rock gardens." (See Baye Report, Footnote 207.) Here he is applying "small but significant" to quantity in a way that surely does not make sense given his claim that would render a monopolist price increase unprofitable.

2. Brown Shoe Factors

80. Professor Baye claimed that I ‘cherry-picked’ the Brown Shoe factors that I chose to evaluate when considering the evidence that was relevant for the purposes of market definition.⁸⁵ I focused on the most relevant factors and left aside ones that did not apply to the market definition for the matter at hand. Specifically, I examined evidence regarding industry recognition, peculiar characteristics or product features and distinct pricing. In each case, I reported empirical evidence that supported my eventual conclusions on the three relevant markets I considered in my report.⁸⁶ I also noted that not all Brown Shoe factors are relevant in every case.⁸⁷ Below, I explain why some of the Brown Shoe factors are not useful for market definition in this case.

81. It is important to note, first, however, that Professor Baye declines to apply even one of the Brown Shoe factors in support of the market he proposes that the court accept; that is, the market “for matched display advertising transactions that is plausibly at least as large as all display ads as defined by eMarketer and other industry participants (e.g., including video ads, mobile in-app ads, social media ads, and direct deals).”⁸⁸

a) Unique production facilities

82. One Brown Shoe factor is whether there are unique production facilities. This factor makes more sense for physical production than information technology, where the primary inputs are general-purpose computing and specific software inputs.⁸⁹ Noting that, for instance, specific computer programs were used to serve ads and provide tools to advertisers would not illuminate the constraints on providers in the market. While Professor Baye suggests that I cherry-picked in leaving aside this factor, he notes “publisher ad servers, ad exchanges, and ad buying tools for open web display ads appear to be “produced” with the same technology (i.e., software) as the tools used for direct deals and other ad formats.”⁹⁰ He goes on to opine that this implied that ad tech providers’ production facilities were not unique, and so the application of that factor would lead to a market definition that he appears to suggest would include *any* software product.⁹¹ Instead, I did not apply this factor because it was not helpful in identifying competitive constraints more

⁸⁵ Baye Report, ¶31.

⁸⁶ Gans Opening Report, Section IV.C.1, IV.D1, IV.E.1.

⁸⁷ *United States v. Google*. No. 20-cv-3010, 2024, page 140. (“Of course, not every Brown Shoe factor is applicable because general search is a free product, so the court does not consider factors related to pricing.”) In that case, the court then recognized the existence of a general search services market based on three Brown Shoe factors only: (1) peculiar characteristics and uses, (2) industry or public recognition, (3) unique production facilities.

⁸⁸ Baye Report, ¶30.

⁸⁹ Baye Report, footnote 199.

⁹⁰ Baye Report, ¶224.

⁹¹ Obviously, Professor Baye’s position is absurd. Should all products produced with labor, or with nails, be in the same relevant order?

than noting that apples and oranges use land, water and farming implements, which would compel a court to define a market for horticultural produce, something that would not assist the court in evaluating the potential harm of the conduct on competition.⁹²

b) Distinct customers

83. Professor Baye claims that the markets I define do not comprise a set of “distinct customers.”⁹³ He opines that many customers in the relevant markets also use other tools outside the market.⁹⁴ This again misunderstands the relevance of this factor. I do consider distinct customers but under my HMT test. In my HMT test I showed that Google does price discriminate between types of ad formats.⁹⁵

c) Specialized vendors

84. Professor Baye opines that the vendors of the relevant markets I define are not “specialized.” He claims that vendors offering the products in the relevant markets also offer similar tools for other digital ad types.⁹⁶ I do not contest that some vendors have offerings other than open web display tools. However, many vendors specialize in one type of advertising.⁹⁷ For instance, AppLovin,⁹⁸ Unity Ads⁹⁹ and Chartboost¹⁰⁰ specialize in in-app advertising. Google also acknowledges that ad servers such as Adap.TV, Tremor, and Freewheel specialize in serving in-stream video advertising.¹⁰¹ Players like Videology and

⁹² Only when a firm has a unique production facility like access to a scarce resource is this factor considered because in that case supply elasticity is limited.

⁹³ Baye Report, ¶37.

⁹⁴ Baye Report, ¶37. (“Ad-buying tools for Professor Gans’ narrow “open web display ads” share customers with tools he excludes from his candidate markets. Likewise, many customers inside Professor Gans’ narrow candidate markets for ad exchanges and publisher ad servers also use ad tech to transact and serve video ads, mobile in-app ads, and other display ads that Professor Gans excludes from his candidate markets.”)

⁹⁵ Barker, Jonathan. “Stepping out in and Old Brown Shoe: In Qualified Praise of Submarkets.” *Antitrust Law Journal* 68, no. 203 (2000): 207-208. (“The term price discrimination market is applied when a hypothetical monopolist of a group of products and location would raise price profitably to a class of targeted buyers [...] Commentators and courts have recognized that at least some of the Brown Shoe factors – particularly distinct customers- can be used to identify this situation”)

⁹⁶ Baye Report, ¶38.

⁹⁷ Deposition of [REDACTED] (Managing Director of Global Publisher Platforms, Google). 158:17-159:17. May 1, 2024.

(“(Counsel): Why do you say that makes you dated, a bit dated? (Ms. Jean): In reference to your question, if you noticed, you reference web. A lot of the dollars are shifting away from web and going to CTV. With companies like Magnite, they specialize just to CTV. Google, on the other hand, does display. [...]”). And 160:7-162:2 (“(Ms. Jean): Vyant specializes in health advertising and is ‘very niche.’”)

⁹⁸ AppLovin. “Take your monetization to the next level” (Undated). Accessed August 30, 2024. <https://www.applovin.com/max> (“Drive the highest yield for your app real estate. Choose the mediation platform with more bidders, more networks, premium AppLovin demand, and custom options for anyone else you work with.”)

⁹⁹ Unity Ads. “Grow your mobile app with Unity Ads” (Undated). Accessed August 30, 2024. <https://unity.com/products/unity-ads> (“Drive your app revenue and growth Unity Ads gives you the tools and analytics to help you achieve your app’s goals. Whether you want to start creating in-app ads, IAPs (in-app purchases), or market your app to a potential audience, Unity Ads has the tools and expertise you need to succeed.”)

¹⁰⁰ Chartboost. “Capture new audiences; Maximize experiences; Grow your business; Increase Revenue” (Undated). Accessed August 30, 2024. <https://www.chartboost.com/company/> (“Built for game developers by game developers. Chartboost is a leading in-app programmatic advertising and monetization platform. We empower developers to earn high CPMs while connecting marketers with highly engaged audiences through immersive ad experiences.”)

¹⁰¹ GOOG-AT-MDL-015402767 at -770. “Preliminary Video Recommendation” (October 2013). Internal presentation on video advertising. (“Estimated Top Pub DFP Penetration, Key competitors: FreeWheel, Adap.tv, LiveRail, Tremor”).

TubeMogul are also specialized in-stream video ad buying tools.¹⁰² While specialized vendors may help reveal useful information about relevant markets in some cases, I do not think it is applicable in this case.

d) Sensitivity to price

85. While not in the section of my Opening Report on Brown Shoe factors, I do consider sensitivity to price directly when I discuss substitution possibilities for customers – both advertisers and publishers – in my application of the HMT.

3. Hypothetical Monopolist Test (HMT)

86. Professor Baye opines that “the [Brown Shoe] factor “sensitivity to price changes,” when applied correctly, embraces the HMT.”¹⁰³ I would go further that this factor calls our attention to the critical question of consumer substitution, as a whole, whether expressed as a HMT or more directly as evidence on the scope of consumer substitution possibilities. My HMT test focuses on demand substitution for the candidate products at issue in response to a SSNIP. None of Google’s Experts have undertaken an HMT analysis. While Professor Simonson uses the language of the HMT test, he does not define a SSNIP, does not begin at competitive prices, and does not measure whether the quality of diversion is sufficient to render any conclusion about the candidate market.

87. Despite the overwhelming majority of my analysis of market definition building and evaluating the evidence on consumer substitution, Professor Baye, while noting the primacy of substitution,¹⁰⁴ declines to engage with that evidence and instead notes that it is not quantitative (providing an estimate of the cross-price elasticities of demand), does not provide a competitive pricing benchmark and relies on the expert evidence of others (notably Professor Chandler) for information on advertiser strategies, values and choices. Professor Baye regards this as a “failure” on my part rather than a natural approach, given the lack of data available to properly analyze consumer demand and the lack of cost data to estimate long-run average cost in order to provide a competitive benchmark.¹⁰⁵ If data were available for this purpose, both sides would likely have undertaken a quantitative HMT. Google’s Experts do not undertake a quantitative HMT analysis, either. Only in the cases where suitable data on prices and quantities are available are quantitative

¹⁰² GOOG-AT-MDL-015402767 at -770. “Preliminary Video Recommendation” (October 2013). Internal presentation on video advertising. (“Estimated Buy Side Penetration, Key competitors: Videology, TubeMogul, AdaptTV, Tremor”).

¹⁰³ Baye Report, ¶225.

¹⁰⁴ Baye Report, ¶185.

¹⁰⁵ I also note that relying on an expert assessment is a hallmark of good practice that Professor Baye also pursues in relying on Professors Ghose and Milgrom.

HMT models employed.¹⁰⁶ This is not such a case. This absence does not preclude the HMT approach from being used to guide a qualitative analysis of market facts and market history to define relevant markets.¹⁰⁷

88. The HMT approach can be extremely helpful in calibrating a qualitative evaluation of market evidence. For example, in evaluating whether ad servers are a relevant market, we ask how a consumer of ad servers would respond to a small but significant non-transitory price increase (typically 5%). For the average paying publisher, this is about [REDACTED] per month.¹⁰⁸ With this calibration, we can ask whether it would make economic sense for a publisher to spend millions to potentially avoid this increase by building their own in-house ad server, as Professor Baye suggests.¹⁰⁹ Thus, the HMT allows us to use empirical evidence to make reasoned judgments about consumer responses. This, in turn, allows us to define a relevant product market.

89. The HMT approach can also be used to identify relevant HMT tests conducted by Google. For example, in 2014, Google Ads increased its take rate for display ads by [REDACTED] from [REDACTED] to [REDACTED].¹¹⁰ The result was higher profits, and Google Ads never lowered the rate back to [REDACTED]. This shows that the relevant market is reasonably construed not to be wider than ad-buying tools for small advertisers. I point to other such situations throughout this report.

90. Professor Baye makes the further extraordinary and false claim that I only consider substitution possibilities that would lead to *all* consumers switching away from the product in question rather than considering substitution at the margin.¹¹¹ This claim is “supported” by a list of manipulated quotes from

¹⁰⁶ Davis, Peter, Eliana Garces. “Quantitative Techniques for Competition and Antitrust Analysis.” *Princeton University Press* (2019): 167. (“Qualitative analysis can sometimes be enough to satisfactorily define the relevant market, indeed it is sometimes necessary to rely on purely qualitative analysis”)

¹⁰⁷ U.S. Department of Justice and the Federal Trade Commission. “Merger Guidelines.” (2023). “Section 4.2 describes some of the qualitative and quantitative evidence and tools the Agencies can use to assess the extent of competition among firms. The Agencies can use similar evidence and analogous tools to apply to the HMT...” (*emphasis added*). See also 2023 Merger Guidelines at 43; Baker, Jonathan. “Market Definition: An Analytical Overview.” *Antitrust Law Journal* 74 (2007): 139. (“Evidence as to likely buyer substitution patterns in the event of an increase in price – the central economic issue at stake in market definition – can be grouped into five categories: past buyer responses; buyer surveys; product characteristics; seller conduct; and views of industry experts. Within each category evidence may be quantitative or qualitative.”) (*emphasis added*). And *United States v. Google*. No. 20-cv-3010, 2024, page 139. (D.D.C. Aug. 5, 2024) (Mehta, J.) (“[...] there is no legal requirements that a plaintiff supply quantitative proof to define a relevant market.”).

¹⁰⁸ Source: DOJ RFP 57 DFP Fees data. See Table 13: the average paying customer pays about [REDACTED] in 2022, i.e., about [REDACTED] per month. A 5% increase in the monthly payment corresponds to [REDACTED].

¹⁰⁹ Baye Report, ¶53.

¹¹⁰ GOOG-DOJ-AT- 00569936 at -936. “Increase GDN margin on AdX from [REDACTED] to [REDACTED] (March 2014). Internal gTrade document on GDN take rate increase and the expected impact.

¹¹¹ In paragraph 15, Professor Baye opines, without basis, “Professor Gans asks whether a hypothetical monopolist could impose such a price increase without losing *all* customers in his candidate market.” (*emphasis in original*) and in paragraph 42, he claims that “Professor Gans’ analysis asserts that a SSNIP is unprofitable only if *all* customers in a candidate product market would decide to *stop using the product*.” (*emphasis in original*) Yet nowhere do I either apply or do this and at those points Professor Baye cites no section of my report.

my Opening Report that were sometimes twisted and sometimes taken out of context.¹¹² As an example, consider this from Professor Baye:

Professor Gans incorrectly asserts that “when there are distinct groups of consumers,” the hypothetical monopolist is prevented from imposing a SSNIP only if “all of those consumer groups will likely substitute away.”¹¹³

91. This suggests that I am considering the threshold to be full substitution. Compare this to my actual report that discussed the issues associated with applying a HMT when there are two sets of customers on different sides of the industry (such as with advertisers and publishers):

When there are distinct groups of consumers that may bear all or part of the price increase under the HMT, then a price increase is not possible if *all* of those consumer groups will likely substitute away to alternatives. However, if not all of those consumer groups will likely substitute away to alternatives, the price increase can still be implemented by the hypothetical monopolist with the incidence (or pass-through) being borne by the consumer group without substitutes.¹¹⁴

92. It is clear that I am not suggesting all consumers have to substitute away for a price increase to be unprofitable. In actuality, in each case where I analyze substitution, I consider substitution at the margin.¹¹⁵

93. Professor Baye makes several other methodological criticisms. They are: (a) that I fail to consider indirect network effects; (b) that I do not consider customer multi-homing; (c) that I fail to recognize that advertiser demand is derived demand; and (d) that I fail to consider vertical integration. I now consider these points in more detail.

a) Indirect Network Effects

94. Professor Baye states that a “hypothetical monopolist that operates in a candidate multi-sided market will generally find it optimal to charge different prices to each customer group, and an increase in the price to any one group may adversely impact participation by members of other groups (due to indirect network effects).”¹¹⁶ In unpacking this, it is important to note that the term “multi-sided market” is one that economists have used in conjunction with markets where prices alone cannot mediate the “within market”

¹¹² Professor Baye implies that I assert that effective substitution by publishers would imply switching entirely from open web to an alternative type of inventory. (See Baye Report, ¶263b) This is true. For a publisher monetizing its open web display inventory to switch to a tool that serves in-app tools, the publisher would have to create and maintain in-app content. Similarly, to use in-stream, social media, search ad serving tools, a publisher would have to start creating video content or build a social media platform or a search engine. Professor Baye also relies on the statements I make about alternative ways for publishers to monetize their content and alternative ways for advertisers to reach users. (See Baye Report, ¶263c,d,e.) However, nowhere in these statements do I claim that all customers would need to switch for the HMT to hold.

¹¹³ Baye Report, ¶263a.

¹¹⁴ Gans Opening Report, ¶131.

¹¹⁵ Below I demonstrate that Professor Milgrom errors in analysing Google’s conduct and its effect by regarding full substitution between providers rather than substitution at the margin as being the benchmark for anti-competitive harm. See section V.

¹¹⁶ Baye Report, ¶193.

externalities that rise. That is, a firm operating in a market is undertaking the task of procuring and matching resources (labor, land, and capital) with buyers in the form of products that embody those resources. The availability of those resources impacts productivity and potentially the quality and affordability of products being sold to buyers. So, a firm's activities with respect to one side (resources) impact the value received on the other side (buyers). Economics has dealt comfortably with this, so long as the interactions on each side of the market can be dealt with through pricing.¹¹⁷ In this respect, much of what occurs in advertising markets is similar to ordinary markets: that is, there are sellers of advertising space (publishers) who charge a price for the use of that space by buyers (advertisers), making it a somewhat straightforward market. Indeed, this carries over to markets where the sides of the markets are not clearly defined as buyers or resource sellers, such as credit cards where prices, if freely set, can embody all relevant information so that these can be analyzed using conventional tools.

95. When there are indirect network effects, the prices set on one side of the market influence behavior that impacts the quality of services or value realized on the other side of the market. An example of this is ride-sharing services such as Uber and Lyft. In those markets, riders, when choosing a service, look both at price and at features such as wait time. This means that operators such as Uber and Lyft know that they will attract more riders if they can ensure that there is a sufficient number of drivers available. That might depend not only on the price offered to those drivers but also on the pricing structure (whether they are paid for availability or actual rides) and other terms (such as the efficiency of their systems in providing signals of where riders are likely to be and be going).

96. Professor Baye notes that the number of transactions completed within a market depends on prices charged on both sides of the market. This is true of most markets.¹¹⁸ What might be different is that when considering the profitability of a price change, as would be done in an HMT, the profits of the monopolist may depend not only on what price consumers are being charged but also on what the change in their behavior resulting from the price change does to the behavior of consumers in a distinct group. When there are indirect network effects, the full effect of a price change would include the full impact on profits, considering effects on each side of the market. As Professor Baye opines, the impact of changes in prices of the same percentage magnitude for distinct products when there are indirect network effects can be

¹¹⁷ Rochet, Jean-Charles, and Jean Tirole. "Two-Sided Markets: A Progress Report." *The RAND Journal of Economics*, 37, no. 3 (2006): 645–67. ("Section 5 then shows that in the presence of (price-setting or bargaining based) payments among end-users, the pure-membership-externalities model applies under some conditions [...]"); Katz Michael, and Jonathan Sallet. "Multisided Platforms and Antitrust Enforcement." *The Yale Law Journal*, 127 (2017), 2142-2175, 2142. ("Courts should consider the price structure of a platform.") and 2159 ("One way to do this in the multiple-markets framework is to consider price changes on one side of the platform while holding prices on the other side constant and examining whether there are significant, plausible feedback effects.")

¹¹⁸ Baye Report, ¶194.

different in terms of their impact on the number of transactions.¹¹⁹ This is, of course, something that any multi-product firm must consider when there are interrelationships between products.¹²⁰

97. In contrast to Professor Baye's assertions, I carefully considered these impacts when evaluating the substitution possibilities for customers that formed the core of my HMT analysis and in my opinion on market power.¹²¹ Importantly, I noted that, so long as one side of the market has limited substitutes for a given ad tech product, taking into account that side of the market alone, a hypothetical monopolist will be able to profitably impose a SSNIP. Specifically, what that means is that there would be a relatively small change in quantity as a result of the price change.¹²²

98. This is important because it implies that, to the extent that there are indirect network effects, there would be little change in the implications of a SSNIP. It is only when the SSNIP results in large quantity effects that there may also be material network effects that adversely impact the profits of a vertically integrated firm. The consideration of indirect network effects might only matter when there are sufficient substitution possibilities. This consideration should be done prior to concluding that the market should be drawn in a broader fashion. Thus, because of indirect network effects, the use of a HMT can be more complex. However, the presence of indirect network effects does not necessarily require that a HMT must be carried out taking all such effects into account.

99. Professor Baye notes that many markets operate within a vertical chain from resource providers to "final consumers." In such markets, the demand from consumers in those markets is derived from the demand from final consumers. Professor Baye opines that advertising products have demand that is driven by a final good of matched impressions. This is also how I characterize the online advertising industry with respect to open web display advertising.¹²³ Baye does not explain how his observation is relevant in this case.

¹¹⁹ Baye Report, ¶194.

¹²⁰ Salop, Steven, Serge Moresi and John Woodbury. "Market Definition." *Antitrust Economics for Lawyers* (LexisNexis), Chapter 1, at Section 4. <https://scholarship.law.georgetown.edu/facpub/1942/> ("Thus, taking into account the fact that firms sell multiple products is essential to implementing both the HMT and HCT for candidate markets with multi-product firms based on an assumption that firms are maximizing pre-merger profits.").

¹²¹ Gans Opening Report, ¶131. ("When there are distinct groups of consumers that may bear all or part of the price increase under the HMT, then a price increase is not possible if *all* of those consumer groups will likely substitute away to alternatives. However, if not all of those consumer groups will likely substitute away to alternatives the price increase can still be implemented by the hypothetical monopolist with the incidence (or pass-through) being borne by the consumer group without substitutes.")

¹²² Rose, Nancy and Jonathan Sallet. "Ohio v. American Express: The Exception That Should Not Become a Rule." *Antitrust* 36, 76 (2022). ("but suppose the newspaper faces little if any competition from other newspapers and holds market power for newspaper subscriptions. That would mean that it could increase prices to its readers above competitive levels – an outcome that would not be thwarted by the presence of the television station as a competitor for advertisers")

¹²³ Gans Opening Report, ¶61. ("Advertising technology, or ad tech, plays a fundamental role in the online display advertising industry. It comprises a set of products or tools that publishers and advertisers use to sell, buy, and transact impressions for open web display advertising.")

100. Professor Baye claims that the application of the HMT requires consideration of derived demand, but his example of ride-sharing highlights precisely why my definition of the relevant markets is appropriate.¹²⁴ In his example, Professor Baye hypothesizes that for ride-sharing, one might consider the ride-sharing services as operating in a distinct market from the specific app that riders have on their phones to access a specific service.¹²⁵ If that were the case, he opines, if you imposed a HMT on the specific app market itself (say an increase in the price of any Uber app), you would conclude that there isn't a specific app market because those consumers would switch to Lyft apps (and its associated ecosystem). That is a plausible argument, but it is not relevant in this case.

101. For Professor Baye's example, one would conclude that it makes no sense to consider competitive constraints on the providers of Uber apps without considering the overall competition between Uber and Lyft. This is correct. But it also highlights precisely what is different in this matter. Uber and Lyft do not offer subscriptions to use their apps. If they offer subscriptions at all, it is for their services. So, there is no distinct app provision that is different from their service provision, and there is no separate app pricing. Any reasonable analysis – say, using Brown Shoe factors – would immediately identify the impracticality of drawing such lines.

102. By contrast, as I have shown, the various products at issue here are distinct. They have distinct pricing, and moreover, Google's conduct is directed at those specific products. Thus, this perspective only reinforces the reasonableness of my conclusions on market definition in this matter.

b) Vertical Integration

103. With respect to vertical integration, Professor Baye endorses the application of the HMT for a single integrated ad tech stack.¹²⁶ However, he does not conduct such a test himself. He opines that when I consider a price increase in one of the markets imposed by a hypothetical monopolist in that market, the costs of that price increase will include the lost profits from other markets to the extent the monopolist is integrated. In other words, Professor Baye proposed that I should consider the hypothetical monopolist as an integrated firm across the ad tech stack.

¹²⁴ I note that in this case I define market for tools not display inventory that is an input. For example, Professor Baye uses an example of ink cartridges that are inputs into printers. He opines that competition in the printer market constrains the price of the ink cartridge which is an input. The relationship between the elasticities of the inputs and outputs are set forth in the Hick-Marshall conditions. In our case the ad server is not analogous to an ink cartridge. It is more like a monopoly trucker required to take the ink cartridge from independent producers to the printer factor. The trucker can exercise market power by transferring surplus from the ink producers even if the cartridge price is constrained. In our case, Google can transfer surplus from publishers up to the point where publishers are unwilling to accept bid prices for their ads.

¹²⁵ Baye Report, ¶201.

¹²⁶ Baye Report, ¶193.

104. Professor Milgrom, however, provides an illustration of why this approach is not appropriate in this case. In his evaluation of one of the conducts investigated in this matter, Sell-Side Dynamic Revenue Sharing, or more specifically, DRSv1, he points to a Google evaluation of the impact of the conduct. Recall that DRSv1 involved reducing Google's take-rate in its AdX auction from its usual [REDACTED] to some lower level so that more transactions would take place on AdX that otherwise would be priced-out by Google's usual take-rate. Recall that I regarded this particular procedure as pro-competitive.¹²⁷ Professor Milgrom provides a set of theorems (notably Theorem 6) that demonstrates that DRSv1 would increase the volume of impressions transacted on AdX and in the market as a whole. To confirm his theory, Professor Milgrom brought my attention to a Google study¹²⁸ on the effects of the DRSv1 implementation: "Google also found that DRS v1 increased the overall AdX match rate by [REDACTED]."¹²⁹ This demonstrates that a [REDACTED] reduction in AdX's take rate increased the overall AdX match rate by [REDACTED]. Taken the other way, this shows that a [REDACTED] increase in AdX's take rate from [REDACTED] to [REDACTED] would have decreased AdX's overall match rate by [REDACTED].¹³⁰ Thus, even though it is not a 100% monopolist of the kind we would apply for a HMT, Google's calculations imply that changing its price back from a lower than the usual take-rate would be profitable, by implementing DSRv2 which brought AdX's average take rate back to [REDACTED] suggesting no competitive constraint beyond the ad exchange market I have defined.

105. This study also illuminates why defining a market based on Google's vertical integration is not appropriate. While Professor Milgrom, for his purpose, focused on the [REDACTED] increase in overall AdX impressions, the conduct itself only lowered the take-rate for non-GDN buyers – that is, those AdX buyers using non-Google ad buying tools as well as DBM (what eventually became DV360).¹³¹ As Professor Baye

¹²⁷ The anti-competitive conduct was the addition of a take-rate inflating balancing out to DRSv2. Gans Opening Report, ¶778. ("The first version of DRS v1 may resemble a form of price discrimination by Google as it allowed Google to offer selective discounts on its take rate to complete transactions. This was consistent with a famous economics result by Google's Chief Economist at the time, [REDACTED], that price discrimination can improve social welfare so long as it leads to an increase in volume. As the take rate in DRS v1 (i.e., the first version of DRS) was always equal to or lower than the existing take rate, it was effectively a price cut and as such could have increased transactions without immediate harm to competition.")

¹²⁸ GOOG-AT-MDL-B-001391461. "LAUNCHED! AdX Dynamic Revenue Share (DRS)" (September 2, 2015). Internal email thread between [REDACTED], and others. ("Last week we launched Dynamic sell-side Revenue Share (DRS) on AdX! It brings an additional [REDACTED] of annual AdX revenue, increasing AdX buyer spend by [REDACTED] from new queries matched. Overall match rate for AdX publishers increases by [REDACTED] and [REDACTED] when selling to AdX buyers.")

¹²⁹ Milgrom Report, ¶436.

¹³⁰ According to Google's study on the effect of DRSv1 implementation, a [REDACTED] reduction in the [REDACTED] AdX take rate returns a [REDACTED] increase in AdX match rate. Thus, the new take rate is [REDACTED] and the new match rate, "y," is [REDACTED] where "x" equals the original match rate prior to the [REDACTED] reduction in the AdX take rate. To reverse the effect of the [REDACTED] reduction in the AdX take rate and return to x, which is equivalent to a [REDACTED] increase in take rate [REDACTED], the match rate would decrease by [REDACTED] i.e., [REDACTED].

¹³¹ GOOG-AT-MDL-B-001391461 at -461, -462. "LAUNCHED! AdX Dynamic Revenue Share (DRS)" September 2, 2015. Email from [REDACTED] to drx-pm@google.com et al. (Launch document provides a table that shows the launch did not apply to GDN buyers.)

notes, DV360 users are charged a take-rate of [REDACTED] of any successful bid.¹³² The study cited by Professor Milgrom notes that for those buyers, the increase in the number of impressions transacted was [REDACTED]. The study notes that the average take-rate conditional on a discount was [REDACTED].¹³³ The study focuses on the [REDACTED] increment to profits but does not calculate the [REDACTED] for its buy-side. This is likely because, despite Google owning both AdX and DBM, the way DRSv1 and v2 were implemented was to allow AdX to secure more impressions, but to the extent they came from DBM, that might be substitution from other exchanges rather than a change in Google's downstream revenue. By contrast, the AdX take-rate is explicitly considered with respect to Google's Bernanke conduct¹³⁴ that took place on GDN, Google's ad buying tool for smaller advertisers, which has monopoly power.

c) Multi-homing

106. As already discussed, I note that multi-homing, in the broad sense Professor Baye uses the term, is not necessarily substitution. Even if publishers or advertisers move between advertising formats, it does not mean that they will stop using a Google ad server or buying tool. For example, if a publisher begins to sell more in-app inventory, as long as they continue to sell display advertisements, they need an ad server. However, this discussion should not be confused with how much actual substitution is actually required to defeat a SSNIP in the HMT.

B. Responses concerning individual markets

107. Google's Experts also opine that the conclusions set forth in my Opening Report in connection with the individual markets that I defined are not supported by the evidence. I now review and rebut their claims for each market individually.

1. The market for publisher ad servers

108. In this section, I consider Professor Baye and Professor Ghose's responses to my definition of a market for publisher ad servers used for the sale of open web display inventory. It is worth noting that Professor Simonson does not survey the publisher side of the market. Even though Professor Simonson

¹³² DBM charged higher take rates in earlier years before the launch of DV360. Rates dropped to the levels then charged by DV360 in 2017. GOOG-AT-MDL-001279248 at -261. "Platforms pricing overview" (Q3 2018). Internal Google presentation. (Slide with Graph: "Deepdive on DBM auction: Price decline on all channels")

¹³³ Google notes that total revenue in AdX would increase by [REDACTED] per annum with publishers receiving an increase of [REDACTED] per annum; [REDACTED] of the total increase.

¹³⁴ GOOG-DOJ-15178498 at -499. "Re: Report on the two-sided dynamic revenue sharing". (October 12, 2014). Email communications between Google employees. ("[... AdX is entitled to charge a higher revshare on a portion of revenue [...]. This increased revshare will have the effect of reducing payout to the pub; buyer charge is not affected. [...] Two main concerns from GDN side [regarding DRS]: 1) Not being able to simulate the auction from GDN side for the purpose of Bernanke. The naive DRS can be simulated, but 2sided DRS may not be simulated without knowing the specific rules")

studies only one side of the market, Professor Baye endorses his approach.¹³⁵ First, I consider Professor Baye's criticisms with respect to conclusions I reached regarding Brown Shoe factors for the ad server market before turning to Professors Baye and Ghose's claims that publishers would face many substitute possibilities that would constrain a price rise for publisher ad servers by a hypothetical monopolist. My opinion is unchanged that publishers do not have any reasonable substitutes for ad servers.

a) Professor Baye's criticisms on Brown Shoe factors

109. As noted earlier, in my Opening Report, I considered evidence related to three Brown Shoe factors that supported the existence of a relevant market for publisher ad servers.¹³⁶

110. **Industry or public recognition:** Industry recognition of a market supports the analysis I offered that ad servers are a relevant market. When customers or other participants recognize the existence of a market, it usually means that claims about close substitutes outside the market are exaggerated. Professor Baye opines that there is no public recognition of the ad server market.¹³⁷ Depositions in this case demonstrate otherwise. Testimony from several industry participants describes a market for ad servers in which Google has a large market share. Those participants include [REDACTED],¹³⁸ [REDACTED],¹³⁹ [REDACTED],¹⁴⁰ [REDACTED].¹⁴¹

¹³⁵ Baye Report, ¶256.

¹³⁶ Professor Baye also claims that I "misappl[y] Brown Shoe's "Distinct and Independent Price Structures" factor" because I "provide no useful information about whether products excluded from his candidate markets have different price structures" (Baye Report, ¶218). However, in my first report, I showed that ad servers, ad exchanges, ad buying tools for small advertisers, and ad buying tools for large advertisers all had distinct pricings (*See* Gans Opening Report, Table 1, 2, 3). Each ad tech tool has a unique pricing structure which differentiates it from other ad tech tools. For instance, ad servers mostly exhibit monthly fees based on impression volume. Ad exchanges all take a share of the revenue transacted. Professor Baye further opines that there is no distinction in pricing between ad buying tools for small and for large advertisers. As I explained in my Opening Report, ad buying tools for large advertisers have large minimum spend requirements, unlike ad buying tools for small advertisers (*See* AMZNTX0002412 at -412. "Re: 1x1" (April 27, 2020)). The pricing structure of ad buying tools for large advertisers thus reflects price discrimination for large advertisers.

¹³⁷ Baye Report, ¶213.

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111. In addition, several government antitrust agencies around the world who have analyzed these markets have concluded that ad servers constitute a separate relevant market.

- a. U.S. Federal Trade Commission (FTC): In its 2007 statement concerning the acquisition of DoubleClick by Google, the FTC defines publisher ad servers as a relevant product market.¹⁴² It defines ad serving as a market, distinct from exchanges and advertiser ad buying tools.
- b. UK Competition & Markets Authority (CMA): The CMA in its 2020 Online Platforms and Digital Advertising Report defines the “publisher ad server market.”¹⁴³
- c. French Competition Authority (FCA): The FCA in its 2021 decision regarding practices implemented in the online advertising sector recognizes the existence of a “publisher ad server market,”¹⁴⁴ distinct from other tools such as advertiser ad buying tools, SSPs, and mediation tools. In its response to the FCA, Google agreed to the definition of a distinct market for publisher ad server.¹⁴⁵

112. Finally, Professor Chandler, himself an industry participant, found that ad servers are a distinct market other than themselves.¹⁴⁶ In contrast, Google’s Experts do not cite any industry participants other than themselves to support their impression transactions market.

113. **Peculiar characteristics and uses:** Professor Baye opines that I failed to demonstrate that ad servers have peculiar characteristics and uses because they also enable the serving of other types of ads such as in-app or video.¹⁴⁷ However, as I demonstrated in my first report, the fact that an ad server can enable the transaction of other types of inventories does not undermine my market definition.

¹⁴² Federal Trade Commission (FTC). “Statement of Federal Trade Commission concerning Google/DoubleClick.” (December 20, 2007). p. 6. (“The evidence shows that third party ad servers play an important role in the delivery and tracking of online advertisements. [...] DoubleClick is the leading firm in the third party ad serving markets.”)

¹⁴³ Competition & Markets Authority (CMA). “Online platforms and digital advertising” (July 1, 2020). p 345. (Concerns that Google is able to use its control of the publisher ad server market to determine auction processes in a way which favours its digital advertising businesses”).

¹⁴⁴ French Competition Authority (FCA). “Decision 21-D-11 of 7 June 2021 regarding practices implemented in the online advertising sector”. (July 26, 2021) p. 74 (“Finally, some competitors have failed to enter the publisher ad server market, even though they had very significant resources.”).

¹⁴⁵ French Competition Authority (FCA). “Decision 21-D-11 of 7 June 2021 regarding practices implemented in the online advertising sector”. (July 26, 2021) p. 63 (“Furthermore, this distinction is not contested by Google, according to whom (translated) “*if the Autorité were to consider that ad servers constitute a separate market, the distinction between publisher ad servers and advertiser ad servers could then be justified*”.”.) (emphasis from original)

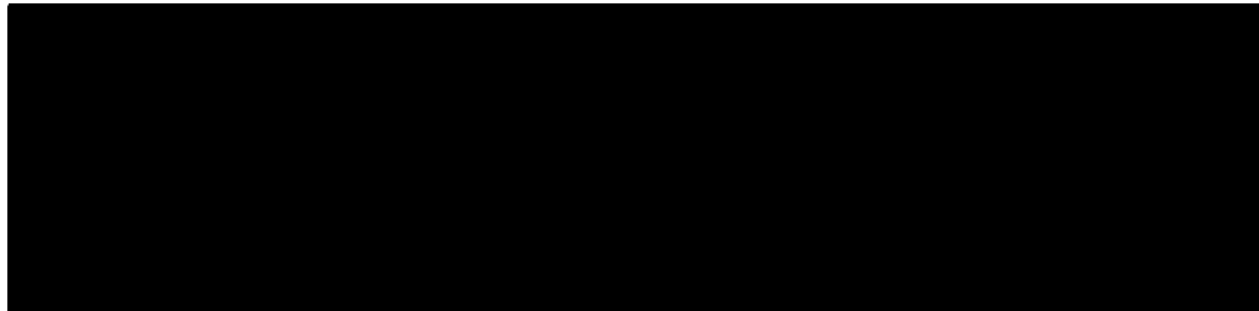
¹⁴⁶ See Chandler Report, ¶176

¹⁴⁷ Baye Report, ¶215.

114. Publishers primarily use publisher ad servers to transact open web display inventory. Other types of inventories, such as instream video inventory, Connected TV inventory, and in-app inventory, form a small fraction of the inventories served by publisher ad servers in comparison to open web display inventory.¹⁴⁸ Publishers that have a large majority of in-app or video inventory usually use specialized ad servers that are specifically intended for in-app monetization, rather than ad servers used for the sale of open web display advertising.¹⁴⁹

115. Table 3 below shows that, in 2021, [REDACTED] of DFP impressions were open web display impressions and [REDACTED] of DFP publishers transacted open web display impressions.

Table 3



116. The fact that ad servers can serve several types of inventory is incidental to the important characteristic that only ad servers can be used to sell display advertising inventory. As I explained in my first report, ad servers have peculiar characteristics: (1) real-time decision-making about serving ads on a publisher's website; (2) managing and selling publishers' ad inventory; (3) targeting capabilities to help publishers identify specific audience segments; (4) collection of data and reporting on ad performance.¹⁵¹ Indeed, ad servers do a lot more than "transact". They provide services only consumed by publishers. This is another reason why Professor Baye's transactions platform market is inappropriate.¹⁵² The transaction

¹⁴⁸ Gans Opening Report, ¶137 ("On the other hand, other types of inventories, such as outstream video inventory, Connected TV inventory, and in-app inventory, form a small fraction of the inventories served by publisher ad servers in comparison to open web display inventory."); GOOG-NE-12106704 at -711. "AdMob + AdManager UX greyzone" (October 2019). Internal presentation on in-app publishers. The document shows that publishers using Google's publisher ad server DFP consisted of [REDACTED] that were web-only (i.e., serve 0% of impressions in-app), [REDACTED] were web-centric (i.e., serve 0% to 25% of impressions in-app), [REDACTED] were mixed (i.e., serve 25 to 75% of impressions in-app), [REDACTED] were app-centric (i.e., serve 75% to 99% of impressions in-app), and [REDACTED] were app-only (i.e., serve 99% of impressions in-app).

¹⁴⁹



¹⁵¹ Gans Opening Report, Section IV.C.1.

¹⁵² Steve Salop, Daniel Francis, Lauren Silman and Michaela Spero, "Rebuilding Platform Antitrust: Moving on from Ohio v. American Express", Georgetown Law Center, (April 2022) at 21 ("Credit card networks provide competitively relevant

platform is the exchange itself and not the services that buyers and sellers use to interface, manage, and fine-tune their interactions with the exchange.

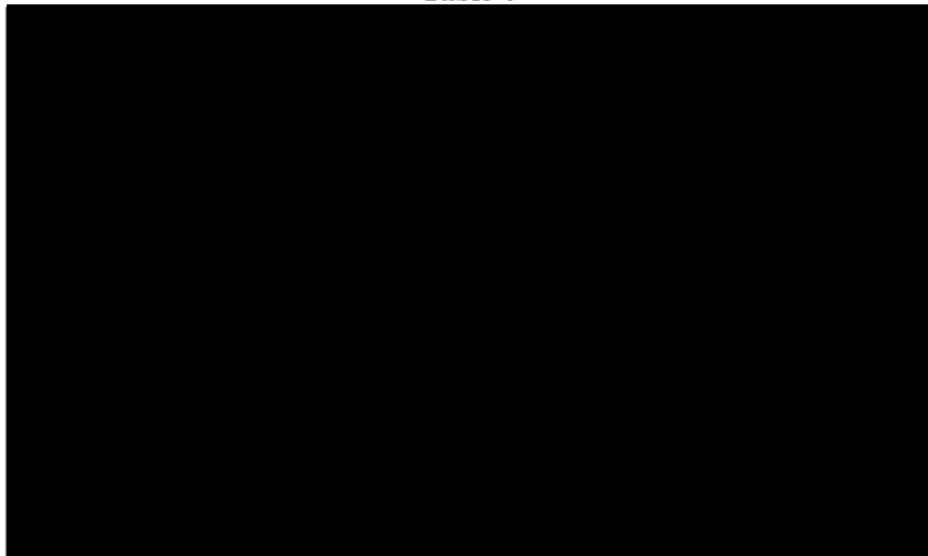
117. Deponents in this case further confirm that ad servers have peculiar characteristics when compared with other ad tech tools.¹⁵³

b) Professor Baye and Professor Ghose's criticism of my HMT approach for ad servers

118. Professors Baye and Ghose claim that publishers would respond to a price increase for ad servers by (1) switching to a subscription model;¹⁵⁴ (2) building their in-house ad server or;¹⁵⁵ (3) would "mov[e] their users from websites to apps."¹⁵⁶ None of these options are reasonable substitutes, and Google's Experts do not provide empirical evidence to demonstrate that they are.

119. Google has developed a complicated fee structure for use of their DFP ad server. The fee is constructed with multiple levels of price discrimination. The following table summarizes the components of the DFP fee.

Table 4



membership services that are not consumed jointly." These services are not consumed "in a purely joint and simultaneous fashion" required by a transactions platform.)

¹⁵³ Deposition from [REDACTED] (Managing Director for Global Publisher Platforms, Google), 91:12-92:2, May 1, 2024. ("Based on the definition of an ad server and the definition of an ad exchange, they serve different functions.") *See also* deposition from [REDACTED] (formerly Vice President of Engineering, Google), 83:23-84:4, March 31, 2021. ("(Counsel): What types of functionality were unique to DFP? (Counsel): Unique versus what? (Counsel): Versus AdSense. [REDACTED]: I would say everything, right.").

¹⁵⁴ Baye Report, ¶242.

¹⁵⁵ Baye Report, ¶243.

¹⁵⁶ Ghose Report, ¶53.

¹⁵⁷ [REDACTED]

120. The amount publishers pay to use DFP depends on several factors:¹⁵⁸

- Google discriminates between small and large publishers. It offers two distinct products: DFP premium and DFP small business. Both products have distinct pricing and, monthly minimum spend requirements.¹⁵⁹
- Google price discriminates by the volume of impressions transacted. For instance, DFP Premium has 14 ascending tiers, each offering a distinct CPM based on the volume of monthly impressions. The higher the volume, the lower the CPM.¹⁶⁰
- Google discriminates between advertising types. Google's rate card has a distinct CPM for display, video, mobile, and audio. Google discriminates based on the complexity of the product offering. For instance, Google's rate card has distinct CPMs for data transfer, the type of audience, etc.¹⁶¹
- Google discriminates based on geography and the maturity of the market. CPMs are distinct between markets, regions, and countries.¹⁶²

121. Google also regularly offers discounts to "top strategic" publishers.¹⁶³ These discounts can go up to 100% of the rate card fees and apply to some or all of DFP features, as well as ad types depending on what it takes to close a publisher.¹⁶⁴

122. The table below shows that total DFP fees have risen even though the share of DFP customers paying fees has declined. Since 2014, approximately [REDACTED] of publishers paid no ad server fee ([REDACTED] of DFP

¹⁵⁸ I also note that Google's rate card structure and level has remained relatively constant between 2013 and 2022. See GOOG-DOJ-AT-02137454 at -457. "Ad Manager Repricing" (February 2019). Internal Google proposal for DFP repricing. ("rate card not updated in >6 years").

¹⁵⁹ Rate cards between 2013 and 2022 have distinct pricing for DFP premium and DFP small business. See GOOG-DOJ-15289466; GOOG-AT-MDL-004119136; GOOG-AT-MDL-004119128; GOOG-AT-MDL-004406987; GOOG-AT-MDL-004119112; GOOG-AT-MDL-004118710; GOOG-AT-MDL-004118704.

¹⁶⁰ Rate cards between 2013 and 2022 show 14 pricing tiers for DFP premium. See GOOG-DOJ-15289466; GOOG-AT-MDL-004119136; GOOG-AT-MDL-004119128; GOOG-AT-MDL-004406987; GOOG-AT-MDL-004119112; GOOG-AT-MDL-004118710; GOOG-AT-MDL-004118704.

¹⁶¹ Rate cards between 2013 and 2022 have distinct pricing between advertising types, including display, video, mobile, and audio. See GOOG-DOJ-15289466; GOOG-AT-MDL-004119136; GOOG-AT-MDL-004119128; GOOG-AT-MDL-004406987; GOOG-AT-MDL-004119112; GOOG-AT-MDL-004118710; GOOG-AT-MDL-004118704.

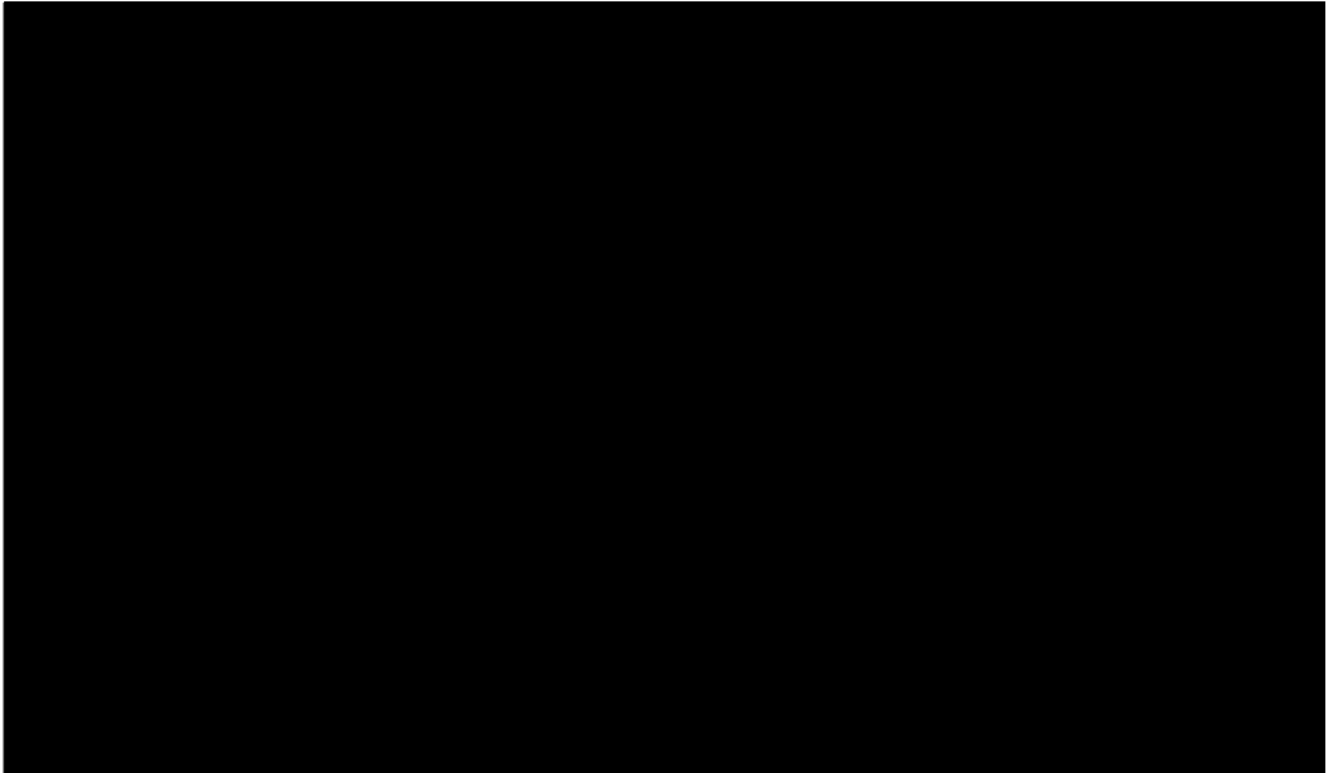
¹⁶² Rate cards between 2013 and 2022 have distinct pricing between different geographies. See GOOG-DOJ-15289466; GOOG-AT-MDL-004119136; GOOG-AT-MDL-004119128; GOOG-AT-MDL-004406987; GOOG-AT-MDL-004119112; GOOG-AT-MDL-004118710; GOOG-AT-MDL-004118704.

¹⁶³ GOOG-DOJ-07799121 at -122. "Re: [GPX] Meeting Agenda for May 1, 2013." (May 1, 2018). Internal email thread discussing discount approvals for Axel Springer, RBC, Walla Communications, and Optus.

¹⁶⁴ GOOG-DOJ-07799121 at -122. "Re: [GPX] Meeting Agenda for May 1, 2013." (May 1, 2018). Internal email thread discussing discount approvals for Axel Springer, RBC, Walla Communications, and Optus. ("DFP ad serving fee maximum 100% discount from rate card. No min monthly fee. DFP Audience: 1st party 100% discount from rate card, Advanced video with and without hosting 100% discount from rate card")

publishers with a company ID). Professor Baye claims that [REDACTED] of DFP customers did not pay an ad server fee between January 2020 and June 2023.¹⁶⁵ This calculation is misleading. It ignores the much higher share of paying customers in DFP before 2019, as shown in Table 5, and the fact that, between 2019 and 2023 a very large amount of very small publishers without company identifiers joins the sample.¹⁶⁶

Table 5



123. In addition, Google DFP prices fluctuate. I present these price changes in Appendix D. Many of these changes are larger than a SSNIP. For example, in 2019 and 2020, total fees increased by [REDACTED] and [REDACTED] respectively. The per impression fee component decreased by [REDACTED] in 2018 but increased by [REDACTED] in 2020.¹⁶⁸ However, during these periods when prices increased, we do not observe publishers adopting subscription models or building in-house ad servers.

124. Moreover, because the ad server fee is above competitive levels at present, if subscription models or in house ad servers were reasonable substitutes, I would expect to see a great deal of publishers adopting

¹⁶⁵ Baye Report, ¶481.

¹⁶⁶ Many of the publishers joining the sample during this period have less than 10,000 impressions per year.

¹⁶⁷ [REDACTED]

¹⁶⁸ See Appendix D.

these options when prevailing prices change as a result of the Cellophane Fallacy.¹⁶⁹ The evidence does not show such adoptions.

125. **Subscription models:** Publishers would not opt to change their entire business model from advertising-based to subscription-based to avoid a SSNIP. Professor Baye opines that “publishers can and do substitute to other means of content monetization, including subscription fees and/or paywalls.”¹⁷⁰ But he has no empirical evidence to support this claim. He provides a single example of a publisher, Hulu, that offers a paid, ad-free model, but did not adopt this subscription model in response to a SSNIP. Indeed, moving to a subscription model is a major business decision with many considerations. I have been unable to identify any such business model changes motivated by small ad server price changes.

126. There are several reasons why adopting a subscription model would not be an economically rational response to a small ad server price increase and for many publishers, subscription models are not an option.

- a. First, as I explained in my Opening Report, charging users for content or taking out paid subscriptions would require changing their relationship with those users who are currently used to content that was freely available. Publishers would need to convince their user base to pay for content that was previously free; something users are often reluctant to do. A 2021 IAB study explains that many publishers would “face serious challenges if forced to depend on subscriptions.”¹⁷¹ The study cites empirical evidence that less than a third of respondents are willing to pay for weather updates, finance content, news, or sports.¹⁷² Similarly, a Reuters study shows that less than a fifth of respondents across 20 countries are paying for online news.¹⁷³ It follows that if a publisher were to switch to a subscription model in response to a price increase in display ad serving, users might decide to consume content on other free digital properties.

¹⁶⁹ Department of Justice. “Monopoly Power, Market Definition, and the Cellophane Fallacy.” (Undated) Accessed August 5, 2024. <https://www.justice.gov/archives/atr/monopoly-power-market-definition-and-cellophane-fallacy>.

¹⁷⁰ Baye Report, ¶242.

¹⁷¹ Interactive Advertising Bureau Europe. “What would an Internet without targeted ads look like?” (2021). Accessed August 12, 2024. https://iab europe.eu/wp-content/uploads/2021/04/IAB-Europe_What-Would-an-Internet-Without-Targeted-Ads-Look-Like_April-2021.pdf

¹⁷² Interactive Advertising Bureau Europe. “What would an Internet without targeted ads look like?” (2021). Accessed August 12, 2024. https://iab europe.eu/wp-content/uploads/2021/04/IAB-Europe_What-Would-an-Internet-Without-Targeted-Ads-Look-Like_April-2021.pdf (“Other sites would face serious financial challenges if forced to depend on subscriptions, with fewer than a third of Europeans willing to pay for weather updates (32%), finance content (31%), news (28%) or sports (26%).”)

¹⁷³ Reuters. “Paying for news: Price-conscious consumers look for value amid cost-of-living crisis” (September 28, 2023). Accessed August 12, 2024. <https://reutersinstitute.politics.ox.ac.uk/paying-news-price-conscious-consumers-look-value-amid-cost-living-crisis#header--8> (“Our research shows that, averaged across 20 countries, less than a fifth (17%) are currently paying for online news. This group tends to be male, richer, and better educated, with a strong interest in news and politics.”)

- b. Second, even if web users were willing to pay for a subscription, users have low willingness to pay. The IAB study shows that in the absence of advertiser funding, a majority of respondents would expect to pay very little for web service.¹⁷⁴
- c. Third, even if web users were willing to pay for a subscription to access a publisher website, many users are unable to afford an unlimited number of subscriptions. The IAB study shows that fewer than half of respondents are willing to pay for more than three subscriptions in total, leaving publishers to compete for a limited pool of subscribers.¹⁷⁵
- d. Fourth, users willing to pay for a subscription often expect high quality and quantity content.¹⁷⁶ Publishers switching to a subscription model would need to invest in content production resources to prevent users from unsubscribing.

127. Deponents in this case suggested that switching to subscription models was not a viable substitute for advertising.¹⁷⁷ They explained that users tend to prefer free content and that subscriptions only account for a small share of revenue.

¹⁷⁴ Interactive Advertising Bureau Europe. "What would an Internet without targeted ads look like?" (2021). Accessed August 12, 2024. <https://iab europe.eu/wp-content/uploads/2021/04/IAB-Europe-What-Would-an-Internet-Without-Targeted-Ads-Look-Like-April-2021.pdf> ("In the absence of advertiser funding, a majority of Europeans surveyed would expect to pay less than €4 per month for most of the web services they currently use.")

¹⁷⁵ Interactive Advertising Bureau Europe. "What would an Internet without targeted ads look like?" (2021). Accessed August 12, 2024. <https://iab europe.eu/wp-content/uploads/2021/04/IAB-Europe-What-Would-an-Internet-Without-Targeted-Ads-Look-Like-April-2021.pdf> ("Fewer than half of Europeans (49%) are willing to pay for more than three such subscriptions in total, leaving web services competing for a limited pot.")

¹⁷⁶ Reuters. "Paying for news: Price-conscious consumers look for value amid cost-of-living crisis" (September 28, 2023). Accessed August 12, 2024. <https://reutersinstitute.politics.ox.ac.uk/paying-news-price-conscious-consumers-look-value-amid-cost-living-crisis#header--8> ("Subscribers are motivated by a desire to access higher-quality news than is available from free sources. They are also looking for a premium user experience or additional benefits such as lifestyle features and games.")

¹⁷⁷



128. In sum, switching to a subscription model to avoid a small price increase above competitive levels would be economically irrational for most publishers,¹⁷⁸ and we do not observe many such business model changes.

129. **In-house ad servers:** Professor Baye claims that “a large publisher substituting to its own in-house solution [...] constrains Google’s ability to exercise monopoly power.”¹⁷⁹ First, he opines that “many publishers do not use third-party ad servers. Instead, they have developed their own technologies for serving ads in-house.”¹⁸⁰ However, Professor Baye only provides the example of five publishers that have successfully developed that in-house solution (Disney+, Hulu, Snapchat, eBay, and LinkedIn).

130. Professor Baye never contends that any but the largest publishers could justify building an in-house ad server. His opinion is that a few large publishers could develop an in-house ad server, and these publishers represent enough impressions that if they switch from a third-party ad server (DFP) to an in-house ad server, it could defeat a SSNIP by a hypothetical ad server monopolist. As a result, Professor Baye thinks the market should include in-house ad servers. However, this ignores the empirical fact that there is price discrimination in ad server pricing, justifying separate relevant markets for publishers without this option.

131. In addition, two of the five publishers cited by Professor Baye, Disney and Ebay, continue to use DFP even though they have an in-house ad server.¹⁸¹ This is because DFP is the only way to access demand from Google Ads. Even if other publishers could afford to build an in-house ad server, there are other business reasons to retain DFP.¹⁸²

132. As noted above, DFP prices are fluctuating, yet we do not observe publishers building in-house ad servers in response.

¹⁷⁸ For the same reasons around users’ price sensitivity and low willingness to pay for online content, paywalls are not a viable substitute for publishers.

¹⁷⁹ Baye Report, ¶304.

¹⁸⁰ Baye Report, ¶243.

¹⁸¹ Source: DOJ RFP 57 – DFP Fees data. Also, *see* Digiday. “How Disney is using its audience data and Hulu’s ad tech to compete with Google, Meta and Amazon” (March 3, 2022) Accessed on September 2, 2024. <https://digiday.com/future-of-tv/how-disney-is-using-its-audience-data-and-hulus-ad-tech-to-compete-with-google-meta-and-amazon/> (“So today it’s a combination of [Google’s ad server and Hulu’s ad server]. Ultimately, it will all be on the Disney ad server.”).

¹⁸² GOOG-AT-MDL-001847442 at -465 to -467. “Investment review for emerging areas incl. Commerce/SPA deepdive.” (March 7, 2022). Internal Google document discussing Yavin for eBay. (“Walled Garden - AdConnector - middle bucket is my recommendation, but more as a way to keep an eye on this concept / market trend / product, less so to track specific metrics since we do not proactively pitch it. This is a tricky one because it is an existing product that was initially built for eBay (code name - Yavin) but we do not pitch it proactively, only reactive basis. Having said that, more and more partners are asking about that type of integration (in Commerce, Video). They want our demand to flow directly into their in house ad servers. Lots of discussions happening on the topic within Product and Sales so I think we should keep a close eye on it.”)

133. Depositions in this case show that many very large publishers, such as [REDACTED] [REDACTED] [REDACTED],¹⁸⁴ [REDACTED],¹⁸⁵ [REDACTED],¹⁸⁶ and [REDACTED] consider building and maintaining their own ad serving solution far too expensive in time and money to be a viable option.¹⁸⁸ Even depositions of Google employees recognize these difficulties.¹⁸⁹

134. As I highlighted in my first report, antitrust authorities have also acknowledged the difficulty of switching from a third-party ad server to an in-house solution, the French Competition Authority concluded:

More exceptionally, a publisher may choose to develop its own ad server solution. This was the case, for example, for the Webedia group, which nevertheless indicated that this in-house solution no longer allowed it to meet the criteria listed above and which in the end opted for Google's technological solution in the course of 2019. In fact, only the largest publishers are currently able to effectively operate a technology solution developed in-house (typically social networks such as Facebook, LinkedIn, etc.). In this respect, publishers with significant resources indicated that it was not

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¹⁸⁸ Jon Baker, "Market Definition: An Analytical Overview", *Antitrust Law Journal* 74 (2007): 139. ("buyer substitution patterns in response to a price increase can be inferred from information about the characteristics of products [...]")

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feasible for them to develop in-house technology which was capable of meeting their needs.¹⁹⁰

135. In sum, in-house ad servers are not reasonable substitutes for a third-party ad server. Professor Baye can only cite to five cases of publishers that built an in-house ad server. Two of these (eBay and Disney) continue to use Google DFP. The testimony in this case by large publishers suggests that in-house ad servers are enormously expensive and can take “five to ten years” to complete.¹⁹¹ Moreover, exclusive use of an in-house ad server would mean foregoing “the unique demand tied to Google Ad Manager.”¹⁹² Finally, because Google can price discriminate, a SSNIP can target the publishers who are too small to build an in-house ad server.

c) Publishers can only sell the inventory that they have

136. Professors Baye and Ghose claim that publishers can substitute from open web display advertisements to other types of ad inventory. However, their opinions make no logical sense and are not supported by evidence. Publishers can only sell the inventory that they have, and if they sell two types of inventory, they will want to monetize both. What Google’s Experts never show is that publishers will move users to other formats in response to a small change in price. From an economics perspective, the costs associated with being able to move users to other formats would be greater than any benefits from substitution.

137. Professor Baye claims that “publishers are not limited with respect to the types of inventory they can sell, as they can and do choose to change their mix of ad types in response to changes in technology and user viewing habits.”¹⁹³ He claims that they simply can “display their content (and hence their ad inventory) in a variety of different digital environments (e.g., on their websites, mobile apps, and/or the websites or applications of other platforms) to best suit their business needs and to respond to the performance of users.”¹⁹⁴ The significance of this statement for the market definition is questionable. The relevant question is whether publishers will stop using an ad server in response to a small price increase.

¹⁹⁰ French Competition Authority. “Decision 21-D-11 of June 07, 2021 regarding practices implemented in the online advertising sector” pg. 16 (July 26, 2021). Accessed on June 4, 2024.

https://www.autoritedelaconurrence.fr/sites/default/files/attachements/2021-07/21-d-11_ven.pdf

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¹⁹³ Baye Report, ¶136.

¹⁹⁴ Baye Report, ¶136.

138. Professor Ghose opines that I “fail[ed] to recognize that the digital landscape has evolved rapidly over the last few decades.”¹⁹⁵ He implies that publishers can now substitute in supply between display ad inventory and in-app inventory. Professor Ghose states, for example, that: “the rapid consumer adoption of mobile devices has allowed publishers to reach new and existing users via mobile apps,”¹⁹⁶ and “publishers have seized those opportunities by investing in moving their users from websites to apps.”¹⁹⁷

139. The evidence, however, does not support Professor Ghose’s broad claim. In Appendix E, I show that only [REDACTED] of AdX publishers sell display advertising and another type of inventory. DFP data and Google internal documents confirm the same pattern for Google’s ad server (see para 113 and 114). So, most publishers only sell open web display inventory. There is simply no evidence, and Google experts do show that in response to a small ad server price increase, these [REDACTED] of publishers would abandon their display inventory and adopt a different serving tool to sell only the non-open web display inventory. If the SSNIP leaves the publishers any profit on display inventory, they should continue to sell display. This is because the display inventories continue to contribute to firm profits. This is basic economic analysis regarding business choices.

140. Even if a publisher decides to sell more non-displayed open-web inventory, they can do so using DFP. In this case, the hypothetical ad server monopolist would recapture the benefit of any switching, and it would not undermine the profitability of the SSNIP.¹⁹⁸

141. In addition, if some customers found it economical to abandon the ad server, an ad server monopolist could target the vast majority of publishers whose only option is display advertising through price discrimination. DFP charges different prices for display inventory,¹⁹⁹ video inventory,²⁰⁰ Connected

¹⁹⁵ Ghose Report, ¶46.

¹⁹⁶ Ghose Report, Section III.B.1.

¹⁹⁷ Ghose Report, ¶53.

¹⁹⁸ Salop Steven, Serge Moresi, and John Woodbury. “Market Definition.” *Antitrust Economics for Lawyers* (LexisNexis); Chapter 1, part 4 (2017). (“In making this comparison, the fact that pre-merger prices are higher than if the firms were selling only a single product is key. Intuitively, a multi-product firm has a unilateral incentive to set higher prices than would a single-product firm.⁵¹ This is because the customers who switch to the other products sold by that same firm are not lost customers.”)

¹⁹⁹ GOOG-AT-MDL-013268463. “AdX Rate Card” (April 12, 2023). Internal Google spreadsheet showing Google’s rates card. (The “Standard Rates” tab shows DFP pricing for display and video.)

²⁰⁰ GOOG-AT-MDL-013268463. “AdX Rate Card” (April 12, 2023). Internal Google spreadsheet showing Google’s rates card. (The “Standard Rates” tab shows DFP pricing for display and video.)

TV inventory,²⁰¹ in-app inventory,²⁰² and direct deals.²⁰³ For instance, a publisher would pay [REDACTED] to serve [REDACTED] video impressions in a month, and only [REDACTED] to serve the same number of display impressions.²⁰⁴ It would be [REDACTED] more expensive in this case for a publisher to switch to video impressions only. This would far exceed a [REDACTED] increase in the price display ad serving fees, and would thus not be a viable substitute for publishers.

142. Deposition evidence in this case further shows that it is difficult to build new types of inventory.

[REDACTED]
[REDACTED].²⁰⁵ Moreover, building and maintaining an app is not an easy alternative for many small publishers: it is costly, time-consuming, and labor-intensive.²⁰⁶ The same holds true for in-stream video ads. It is also costly and complex for a publisher to start producing video content. The growth of in-app inventory by itself does not mean there is a supply substitution. Because the same ad server can be used for in-app ads, it means that the ad server monopolist would internalize switching by publishers to in-app ads. As I explained in my Opening Report, publishers that heavily monetize their in-app inventory use specialized tools, called mediation tools.²⁰⁷ Google, for instance, segments publishers that are “app-centric” from “web-centric” publishers by offering a mediation tool called AdMob.^{208,209}

²⁰¹ GOOG-NE-09180083 at -169, “2019 Video Deep Dive – [REDACTED]” (September 2019). Internal Google presentation on video inventory. [REDACTED]

²⁰² For example, Google exempted in-app ads from its Unified Pricing Rules. I also note that AdMob charges a [REDACTED] take rate to publishers. *See* Publift, “Google AdMob vs AdSense: What’s the Difference?” (August 14, 2024). [REDACTED]

²⁰³ GOOG-NE-03467508 at -559, “Business Forecast Meeting (Sell-Side)” (June 24, 2019). Internal Google presentation to review past performance, forecast the sell-side business, and develop business strategies; *See also*, GOOG-DOJ-15375402 at -402, “Re: Pandora DRX Renewal - Finance Questions” (March 15, 2018). Internal email thread between [REDACTED], and others.

²⁰⁴ *See* GOOG-AT-MDL-013268463, “AdX Rate Card” (April 12, 2023). Internal Google spreadsheet showing Google’s rates card. (The “Standard Rates” tab shows DFP pricing for display and video.)

²⁰⁵ [REDACTED]

²⁰⁶ *See* Business of Apps, “App development cost” (Undated). Accessed August 9, 2024. <https://www.businessofapps.com/app-developers/research/app-development-cost/> (provides estimates and cost benchmarks of app development)

²⁰⁷ GOOG-NE-06866438 at -511, “Sell-side All Hands” (February/March 2018). Internal Google PowerPoint on sell-side tools topics (yield maximization, web developers, etc.). (Presentation delineates that the “market segmentation that applies to the vast majority (over [REDACTED] of app developers: publishers who are app-centric or app-only” use AdMob, while publishers who have both app and web inventory use DFP).

²⁰⁸ GOOG-NE-07251927 at -995, “Display and Video Strategy Book” (August 2014). Internal Google document about its business, platforms, and strategies. (“Mobile app developers are considered a separate customer segment from (web) content publishers, and AdMob is their monetization platform.”); GOOG-NE-04001130 at -131, “What are the guiding principles and approached for our publisher strategy, given the ecosystem change?” (September 10, 2018). Internal Google paper discussing about Google’s sell-side business. (Google further makes the distinction between both types of publishers: “App developers using AdMob are mostly pure play with little/no web presence,” which sets them apart from open web display publishers.)

²⁰⁹ Additionally, Professor Baye implies that publishers can monetize their content through the website or application of other platforms (see Baye Report, ¶ 135). However, none of the evidence he provides challenges the lack of substitutability for publishers’ display inventory. Professor Baye explains that third-party publishers can utilize Disney and Walmart’s ad tech. (*See* Baye Report, Footnote 25). However, the evidence he uses only supports the fact that *advertisers* can use Disney’s and

143. Because publishers have no reasonable substitutes for Google’s ad server and because there are also little or no network effects that would undermine the profitability, following a SSNIP by a hypothetical monopolist of ad servers, ad servers for open web display constitute a relevant product market.

2. The market for ad exchanges

144. In my Opening Report, I opined that there is a relevant market for ad exchanges for transacting indirect open web display advertising. Professor Ghose and Professor Simonson do not contest the existence of a market for ad exchanges. I respond here to Professor Baye’s criticism of my market evidence.

145. Professor Baye first opines that there is no public recognition of the ad exchange market.²¹⁰ This is untrue. One only needs to read the third-party testimony in this case. The following participants recognize the existence of the relevant market and Google’s dominance within: [REDACTED],²¹¹ [REDACTED],²¹² [REDACTED].²¹³ The U.K. antitrust agency, the CMA, defines the “SSPs market” (i.e., the exchange market) as a relevant product market.²¹⁴ Similarly, the French Competition Authority defines a “market for non-search supply-side platforms” (i.e., exchange market) as a separate market.²¹⁵ Again no antitrust agency I am aware of that has investigated ad tech markets has defined a transaction platform market.

Walmart’s ad tech. This is consistent with my understanding of Walled Garden publishers’ ad tech stack (*See* Gans Opening Report, ¶ 222). Professor Baye also mentions Microsoft SSP (*See* Baye Report, Footnote 25). This is also consistent with my understanding of the market: in my first report, I include Microsoft as one of the players in the market for ad exchanges (*See* Gans Opening Report, Table 6). Professor Baye then mentions Amazon Publisher Services (*see* Baye Report, Footnote 25), including products such as Transparent Ad Marketplace (TAM) and Unified Ad Marketplace (UAM). These products are Header Bidding wrappers that still require publishers to use an ad server. Hence, they are not substitutes to publisher ad servers but rather tools publishers can couple to their ad server to improve their monetization. Similarly, the Facebook monetization tool that Professor Baye presents still requires publishers to use an ad server (*See* Baye Report, Footnote 25). It acts as an additional source of revenue rather than a substitute to an ad server. In sum, Professor Baye fails to demonstrate that publishers can switch from an ad server to a Walled Garden publishers’ ad tech stack.

²¹⁰ Baye Report, ¶ 213.

²¹¹ [REDACTED]

²¹² [REDACTED]

²¹³ [REDACTED]

²¹⁴ Competition & Markets Authority. “Online platforms and digital advertising” (July 1, 2020)

https://assets.publishing.service.gov.uk/media/5fa557668fa8f5788db46efc/Final_report_Digital_ALT_TEXT.pdf, p. 283

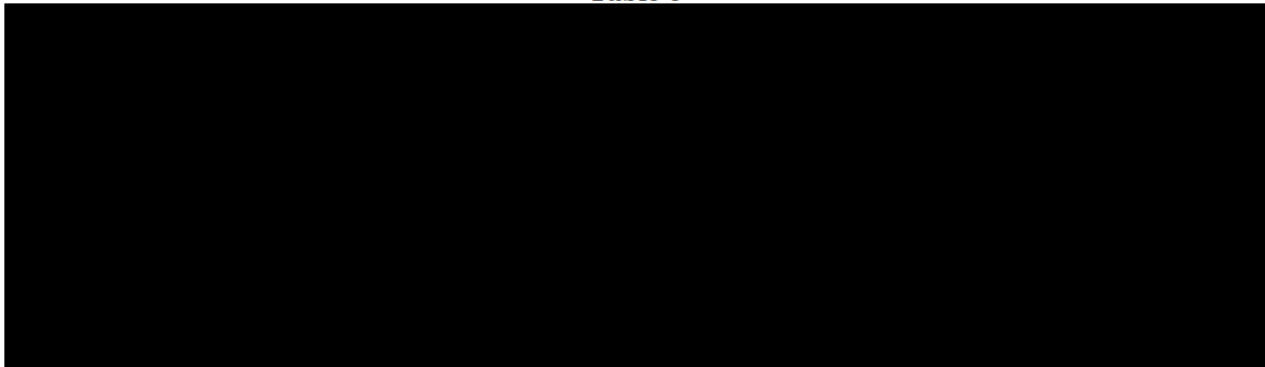
(“Google allegedly engages in self-preferencing behaviours between its DSPs and its SSP (AdX), therefore extending its market power from the DSP market to the SSP market.”).

²¹⁵ French Competition Authority (FCA). “Decision 21-D-11 of 7 June 2021 regarding practices implemented in the online advertising sector” (June 2021), p. 58 (“This practice is likely to have, and has already had, anti-competitive effects on the European market for non-search supply side platforms.”)

146. Professor Baye also opines that I fail to demonstrate that ad exchanges have peculiar characteristics because they also enable the transaction of other types of ads, such as in-app or video.²¹⁶ The fact that an ad exchange can enable the transaction of other types of inventories does not undermine my market definition. While an ad exchange can transact several types of inventories, they are primarily used to transact indirect open web display advertising. Further, in my Opening Report, I provide evidence that, through DRS, AdX price discriminates between inventory types, mainly, between in-app and display inventory within a given geography (U.S.).²¹⁷

147. Table 6 below shows that [REDACTED] of publisher properties selling on AdX consist of open web display inventory. Publisher properties distinguish the various types of inventories a publisher may have. Professor Baye performed a calculation by publisher parent company. He claims that only [REDACTED] of AdX publishers sell only display ads using this metric.²¹⁸ However, for the reasons described in Appendix E, Professor Baye's number is a result of a flawed data analysis. After correcting Professor Baye's data analysis, in Table 16 in Appendix E, I show that [REDACTED] of AdX publishers' parent companies, who may have several types of properties, sell exclusively open web display inventory. Approximately [REDACTED] of AdX publisher parent companies sell display and another type of inventory.²¹⁹

Table 6



148. Moreover, deponents in this case consider ad exchanges to have peculiar characteristics, distinct from other ad tech tools. For example, a Google Managing Director explained that AdX has “separate functions,” distinct from other tools such as DFP.²²¹

²¹⁶ Baye Report, ¶216.

²¹⁷ See Gans Opening Report, Figure 35.

²¹⁸ Baye Report, ¶258 and Exhibit 14.

²¹⁹ See Appendix E.

²²⁰ [REDACTED]

²²¹ Deposition from [REDACTED] (Managing Director for Global Publisher Platforms, Google), 78:18-79:11, 91:12-92:2, May 1, 2024. (“(Counsel): And when you say “two separate functions,” can you explain AdX’s separate function? [REDACTED]: Okay. So just to clarify, Ad Manager is the ad server that the publishers licensed that they sit on. AdX is a technology that actually brings

149. In connection with my HMT for ad exchanges, in paragraph 103, I describe an HMT test conducted by Google referenced by Professor Milgrom.

150. It is important to understand that a [REDACTED] increase in the AdX take rate is a change from a take rate of [REDACTED] to [REDACTED]. As I explained in my Opening Report, the publishers and advertisers will each pay a portion of the increase based on their elasticities. Because publishers have no realistic options, the publishers will be forced to bear the burden of the SSNIP in lower payments for their inventory. Unless publishers react by reducing display inventory, there will be no indirect network effects. This means that a hypothetical ad exchange monopolist would find a SSNIP profitable.

151. Professor Baye suggests that publishers might avoid a SSNIP by a hypothetical ad exchange monopolist by turning to direct deals.²²² Again, Professor Baye fails to support his claim with explanation or evidence. His reasoning for including direct deals is simply that publishers can do them.²²³

152. Likewise, Professor Ghose opines that “publishers can substitute between direct and indirect ad placements.”²²⁴ Professor Ghose also provides no evidence to support this claim. He simply states “that some publishers like Bloomberg have shifted their indirect advertising sales to direct deals”²²⁵ and quotes one 2022 article.²²⁶ But anecdotal evidence of unidentified publishers is certainly not dispositive or even probative without more facts.

153. Professor Baye and Professor Ghose do not address my discussion of these issues in my Opening Report. There, I made the following points: (1) traditional direct deals are inefficient, and negotiations are time-consuming;²²⁷ (2) direct deals require publishers to accurately forecast their website visits to predict

the advertising dollars to the publisher. A publisher may not necessarily need to use AdX. Sometimes they do; sometimes they don't. Hence, the reason to separate. So an ad server is GAM. AdX is a technology that brings the dollars in. Not the same thing. [...] (Counsel): So just to summarize, in your opinion, AdX and Google Ad Manager are separate technologies based both on your work at Google and also your work outside of Google in the industry, correct? ([REDACTED]): Based on the definition of an ad server and the definition of an ad exchange, they serve different functions. (Counsel): And that is based on your work at Google and in the broader industry outside of Google, correct? ([REDACTED]): That is correct.”)

²²² Baye Report, ¶97.

²²³ Professor Baye's sources undermine his opinion. Professor Baye cites a Martech article titled “Display Ads: How Direct Buys & RTB Interact.” The article actually supports my opinion. It states “most publishers are unable to sell off their inventory directly” and shows that direct deals yield higher RPM, and require more technology and manual efforts than indirect deals.

²²⁴ Ghose Report, Section III.C.

²²⁵ Ghose Report, ¶97.

²²⁶ Ghose Report, Footnote 260.

²²⁷ Gans Opening Report, ¶199. (“Traditional direct deals were inefficient because negotiations were time-consuming, sometimes stretching over weeks before both publishers and advertisers could achieve an agreement.”); See Headerbidding.co. “Insertion Order (IO) – Everything You Need to Know” (December 21, 2023). Accessed on May 9, 2024. <https://headerbidding.co/insertion-order/>; See also, Boston Consulting Group. “A Guaranteed Opportunity in Programmatic Advertising” (February 7, 2018). Accessed on May 2, 2024. <https://www.bcg.com/publications/2018/guaranteed-opportunity-programmatic-advertising>.)

the amount of inventory available;²²⁸ (3) exclusive use of direct deals can result in leftover surplus;²²⁹ (4) indirect deals began as a method to sell remnant inventory, a point Professor Ghose himself acknowledges in his report.²³⁰ Google's Experts do not challenge any of these points.

154. Professor Baye and Professor Ghose are also surprisingly silent concerning the deposition testimony in this case, which supports my conclusions and was cited in my Opening Report. As I explained there, [REDACTED], explain the lack of substitutability between direct and indirect deals.²³¹ [REDACTED] even states that direct and indirect deals are complements.²³² They also ignore the supporting evidence presented by a 2018 BCG study.²³³ Additionally, the lack of substitution with direct deals is noted by [REDACTED]²³⁴ [REDACTED]²³⁵ [REDACTED]²³⁶ and [REDACTED]²³⁷.

155. Empirical evidence shows that direct deals are not a reasonable alternative to open auction sales.²³⁸ Much of direct deals nowadays is done programmatically via ad exchanges, so it is not a replacement for ad exchanges.²³⁹ As seen in Figure 29 in Appendix D, AdX also charges a very different take rate for programmatic guaranteed transactions ([REDACTED]) compared to open auction ([REDACTED]). Professor Baye also finds

²²⁸ Gans Opening Report, ¶199. ("For direct deals, publishers needed to predict how much inventory would be available for a given period of time and struggled to accurately forecast how many users would visit their website, sometimes leaving them with surplus inventory.")

²²⁹ Gans Opening Report, ¶199. ("Historically, indirect deals stemmed from publishers' need to sell this surplus inventory.")

²³⁰ Ghose Report, ¶203.

²³¹ Gans Opening Report, Footnote 190 and 191.

²³² [REDACTED]

²³³ Gans Opening Report, Footnote 189.

²³⁴ [REDACTED]

²³⁵ [REDACTED]

²³⁶ [REDACTED]

²³⁷ [REDACTED]

²³⁸ Gans Opening Report, ¶199-211.

²³⁹ AdExchanger. "How Direct Deals are Evolving in the Age of Programmatic" (November 30, 2018). Accessed September 5, 2024. <https://www.adexchanger.com/the-sell-sider/how-direct-deals-are-evolving-in-the-age-of-programmatic/>

that direct deals accounted for approximately [REDACTED] of DFP impressions between 2013 and 2023.²⁴⁰ This is consistent with the historical context of the online display advertising industry whereby direct deals have been phased out as publishers have retired and reduced their capabilities to offer inventory through such deals.²⁴¹

156. In sum, there are no reasonable substitutes for an ad exchange, and Google's Experts have failed to identify any such alternatives to using an ad server to sell display inventory.

3. The market for ad buying tools for small advertisers

157. Google's Experts, Professors Baye and Ghose, make several claims concerning the existence of a relevant market for ad buying tools for small advertisers. First, they contend that small and large advertisers are not distinctive customer classes from the perspective of suppliers of buy-side tools in display advertising. Second, they contend that advertisers placing open web display advertisements have multiple marketing channels and substitute between them.

a) Small and large advertisers represent distinctive customer classes

158. Small advertisers primarily use Google Ads and large advertisers primarily use DV360. In Appendix F, I tabulate advertiser use of DV360 and Google Ads. [REDACTED] small advertisers that spend less than \$[REDACTED] per month use Google Ads. This represents [REDACTED] of all Google Ads users. Advertisers spending above [REDACTED] per month represent [REDACTED] of Google Ads users. In contrast, only [REDACTED] advertisers below [REDACTED] per month (but representing [REDACTED] of DV360 users) use DV360. Further, Figure 33 and Figure 34 in Appendix F show that advertisers of different sizes purchase different type of inventory via Google Ads and DV360.

159. Small advertisers on DV360 are very distinct from those on Google Ads. The inventory purchased by small advertisers on DV360 differs from what is purchased on Google Ads. Advertisers with average spend of less than [REDACTED] a month purchase YouTube, AdSense, AdExchange and AdMob on Google Ads. The ad spend on YouTube for such advertisers is around [REDACTED] of their spend across inventories.²⁴² On the other hand, similar small advertisers primarily purchase third-party exchanges' inventory as well as AdExchange inventory on DV360. Small advertisers on DV360 rarely purchase YouTube inventory (less than [REDACTED] of ad spend).²⁴³

²⁴⁰ Baye Report, Figure 144.

²⁴¹ Gans Opening Report, ¶199.

²⁴² See Figure 33 in Appendix F.2.

²⁴³ See Figure 34 in Appendix F.2.

160. Professor Baye states that more than [REDACTED] advertisers who purchase narrow display ads on Google Ads and DV360 account for approximately [REDACTED] of Google Ads narrow display ad spend in the period between July 2015 and March 2023.²⁴⁴ I adapt his analysis for the period between January 2020 and March 2023 and find that less than [REDACTED] advertisers used Google Ads and DV360 to buy the same type of inventory for display ads. These advertisers constitute less than [REDACTED] of total advertisers on Google Ads in the same period.²⁴⁵ Further, restricting to advertisers with Google ad spend of under [REDACTED] per month as Professor Baye does, I find that advertisers that “multi-home” on both Google Ads and DV360 account for less than [REDACTED] of the advertiser spend on Google Ads from all advertisers below that spend threshold.²⁴⁶

161. The data on advertiser spending shows that these large advertisers do buy some display advertising on Google Ads. This occurs because Google allocates left-over Search advertising spend to display.²⁴⁷ However, this type of multi-homing is not relevant to my market definition because Google owns both products. If the Google Ads take rate for display advertising was increased by a SSNIP, any switching to DV360 would be recaptured.

162. Most of what Professor Baye calls multi-homing is not multi-homing at all. Multi-homing means using different tools to purchase the same products or services. Here advertisers use different tools to purchase different ad types. Contrary to claims made by Professor Baye, the multi-homing between buying tools (Google Ads and tools not owned by Google) is quite small. In Appendix F.4., I show that advertisers that multi-home on Google Ads and another buyer tool represent [REDACTED] of advertisers in 2022.

163. In fact, this estimate is inflated as several of the third-party buying tools included by Professor Baye are used by advertisers for specific purposes. Criteo and Nextroll (formerly known as Adroll) are recognized as leaders for re-targeting ads.²⁴⁸ Simpli.Fi brands itself as a CTV and mobile programmatic advertising

²⁴⁴ Baye Report, ¶233. For Google Ads, I restrict transactions where ad_format is Display, product_area is DVA, environment Web & inventory source is restricted to 3PE, AdExchange, AdSense or Demand Product, front_end, is AdWords & transaction_type is Open Auction.

²⁴⁵ See Table 20 in Appendix F.3.

²⁴⁶ See Figure 35 in Appendix F.3.

²⁴⁷ AdWords keyword campaigns are opted into the entire Google network by default and offers bundles to advertisers that include different ad formats, depending on campaign goals selected. (See GOOG-DOJ-17360264 at -318. “adspro” (November 26, 2010). Internal Google email newsletter from [REDACTED]. (“The Google Network is split into the Search Network [...] and the Display Network [...]. By default, AdWords keyword targeted campaigns are opted into the entire Google Network: Google search, search partners, and the Display Network”); Measure School. “How to Setup a Google ads Search Campaign (and avoid fatal mistakes)” (June 29, 2023). Accessed on September 3, 2024. <https://measureschool.com/google-ads-search-campaign/>; Google Ads Help. “About ad formats available in different campaign types” (Undated). Accessed on September 3, 2024 https://support.google.com/google-ads/answer/1722124?hl=en&ref_topic=3121941&sjid=1065949975726748684-NC#zippy= (“The ad formats available depend on campaign type (App, Display, Local, Performance Max, Search, Smart, Shopping, and Video) and campaign goal (for example, “Drive conversions” for Video campaigns or “App installs” for App campaigns). Ads may show on numerous devices, such as mobile, desktop, or TV.”)

²⁴⁸ Criteo. “Q4 & Full Year 2022 Earnings” (February 8, 2023). Accessed on August 29, 2024. https://criteo.investorroom.com/download/Criteo_Q4-2022-Earnings_Presentation_FINAL.pdf. (In 2022, 63% of its revenue came from its re-targeting

platform.²⁴⁹ Twenga is primarily a price comparison service solution that is focused on Shopping Ads.²⁵⁰ Again, use of different tools for different purposes is not multi-homing.

164. Google refers to this as “media buying fragmentation,” which Google explains as advertising “purchasing different buckets of media through different DSPs, networks, and channels. Maybe an advertiser loves the CTV offerings from The Trade Desk, our fiercest DSP competitor, they buy all their CTV through The Trade Desk. They also love YouTube and buy YouTube through Google Ads. And they always negotiate a yearly deal with New York Times that they buy directly with the publisher outside of a DSP.”²⁵¹

b) Professor Ghose on large and small advertisers

165. Professor Ghose also examines the advertiser-size market segmentation question. According to Professor Ghose “ad buying tools are not segmented according to customer size.”²⁵² Professor Ghose makes this point on the basis of a few weak opinions.²⁵³ First, he explains that ad buying tools for small advertisers is not a term used in the industry in his experience.²⁵⁴ In that regard, Professor Ghose’s experience is at odds with how Google internally refers to different advertiser groups by size. Several Google documents use the term “tail” (or even “long-tail”) to refer to the small advertisers in Google Ads, which Google typically contrasts with “torso” (mid-sized advertisers) and “head” (large advertisers).²⁵⁵ He opines that ad buying tools for small advertisers and ad buying tools for large advertisers share many of the same

business.); Forbes. “What Is Retargeting And Why Is It Important?” (May 20, 2020). Accessed on August 29, 2024. <https://www.forbes.com/councils/forbesagencycouncil/2020/05/20/what-is-retargeting-and-why-is-it-important/> (“If you’re using AdRoll or a similar product, you’ll set up a campaign and issue a pixel ID, which is easily pasted into your website as a piece of code and inside the ad set as corresponding code.”).

²⁴⁹ Blackstone. “Blackstone Announces Significant Investment in Simpli.fi, a Leading Programmatic Advertising Platform, at \$1.5 Billion Valuation” (June 28, 2021). Accessed on August 29, 2024. <https://www.blackstone.com/news/press/blackstone-announces-significant-investment-in-simpli-fi-a-leading-programmatic-advertising-platform-at-1-5-billion-valuation/> (“the Company’s innovative CTV and mobile programmatic advertising platform powers over 120,000 campaigns for 30,000 active advertisers.”).

²⁵⁰ Twenga Solutions. LinkedIn Page. Accessed on September 2, 2024 <https://www.linkedin.com/company/twenga/> (“Our mission is to drive incremental sales while maximizing your Revenue from Shopping Ads and Price Comparison services”)

²⁵¹ GOOG-AT-MDL-006787342 at -369. “CG&E M&A Programmatic Training” (January 27, 2022). Google presentation for an internal training on programmatic topics.

²⁵² Ghose Report, ¶250.

²⁵³ Professor Baye also contests the existence of two distinct product markets. However, he does not develop a supporting opinion. He only states: “[Professor Gans] attributes his definition of a “small advertiser” to an unsupported reference to Google’s characterization of these words. And when Professor Gans identifies competitors in his candidate market, he provides inconsistent lists of firms and provides no explanation of the criteria he utilized to select those few advertiser buying tools from the hundreds of display ad buying tools report in the data.” See Baye Report, ¶214.

²⁵⁴ Ghose Report, ¶250.

²⁵⁵ GOOG-AT-MDL-003563640 at -649. “LTV Overview 7 2020 Highlights” (August 2021). Google presentation on advertiser lifetime value. The slide shows that long-tail advertisers spend \$1k per quarter. See also GOOG-NE-02345420. “Evolution of Aristotle & Lincoln” (December, 2013); GOOG-NE-02340053. “Project Lincoln Working Session” (April, 2013). Internal presentation on DBM and GDN differentiation.

characteristics.²⁵⁶ But important characteristics differ between the products. As I pointed out in my Opening Report, large ad buying tools offer more sophisticated features.²⁵⁷

166. Professor Ghose references two depositions to support his point. He quotes [REDACTED] deposition but mischaracterizes it. Professor Ghose focuses on the statement, “size is not the only determinant of what an advertiser might want to do.”²⁵⁸ This answer implies that customer size *is* indeed a determinant to some extent. Moreover, [REDACTED] full statement is “[REDACTED]”

[REDACTED]²⁵⁹ While the previous slide makes many statements, it clearly shows that the “customer segmentation” of GDN is “typically smaller and mid-sized marketers”; and that of DBM is “large display buyers.”²⁶⁰ Moreover, [REDACTED] himself in 2013 wrote that: “[REDACTED]”

[REDACTED]²⁶¹

167. Similarly, the second deposition of [REDACTED] does not bolster the fact that “ad buying tools are not segmented according to customer size.”²⁶² [REDACTED] states that “Both Display & Video 360 and Google Ads have a mix of sophisticated and less sophisticated advertisers.” I do not contest that there is a range of customer profiles on each tool. This, however, does not support the fact that tools are not segmented for different advertiser size.

168. Depositions in this case show that small ad buying tools and large ad buying tools are distinct tools. For example, [REDACTED] acknowledges the distinction between DSPs and ad networks.²⁶³ Other deponents

²⁵⁶ Ghose Report, ¶250.

²⁵⁷ See for instance, Gans Opening Report, ¶282. (“GDN and DBM need to have different set of features and controls. [...] it makes little sense to design the two products to have complete feature and control parity.” See GOOG-TEX-00873439 at -439. “Thoughts on Product/Advertiser Segmentation Around GDN & DBM” (October 25, 2013). Internal Google document discussing how to help advertisers to use GDN and DBM.).

²⁵⁸ Baye Report, Footnote 4.

²⁵⁹ [REDACTED]

²⁶⁰ GOOG-DOJ-03238507 at -247. “Media Review” (September 2015). Internal presentation showing Google’s customer segmentation of GDN and DBM.

²⁶¹ [REDACTED]

²⁶² Ghose Report, ¶250.

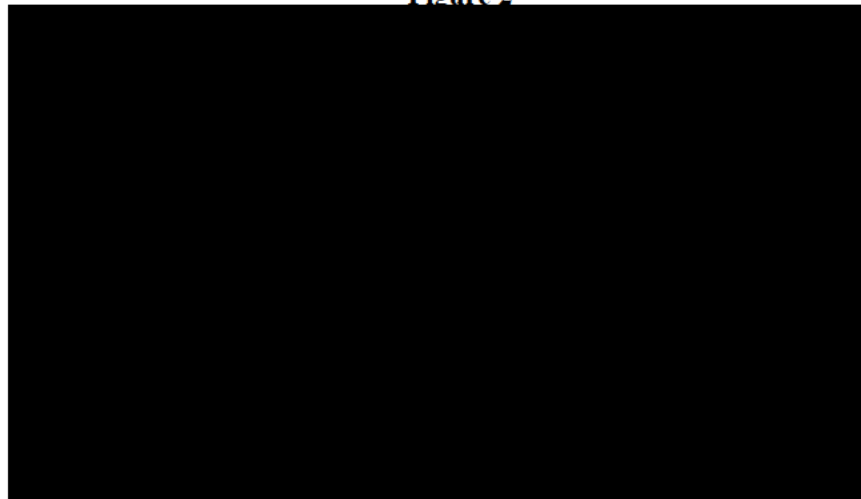
²⁶³ [REDACTED]

in this case have stated that advertisers would not switch away from Google Ads: for example, [REDACTED]
[REDACTED]²⁶⁴ and a deponent from [REDACTED].²⁶⁵

c) Response to Professor Baye on market definition for ad buying tools for small advertisers

169. Professor Baye criticizes my HMT because quantitative data appropriate for econometric testing was not made available by Google. However, Google actually conducted its own HMT experiment in 2014. Google increased the take rate for display ads on Google Ads by [REDACTED] from [REDACTED] to [REDACTED].²⁶⁶ Google measured higher profits and Google never lowered the rate back to [REDACTED]. In a November 2, 2023 document, Google states, “Google Ads will retain on average [REDACTED] of advertiser spend.”²⁶⁷ The summary from the document is displayed below.²⁶⁸

Figure 2



170. Google conducted another HMT experiment in 2018. In a simulation, Google increased Google Ads’ margin on AdX from [REDACTED] to [REDACTED]. Despite increasing its take rate by more than [REDACTED], Google observed

²⁶⁴ [REDACTED]

²⁶⁵ [REDACTED]

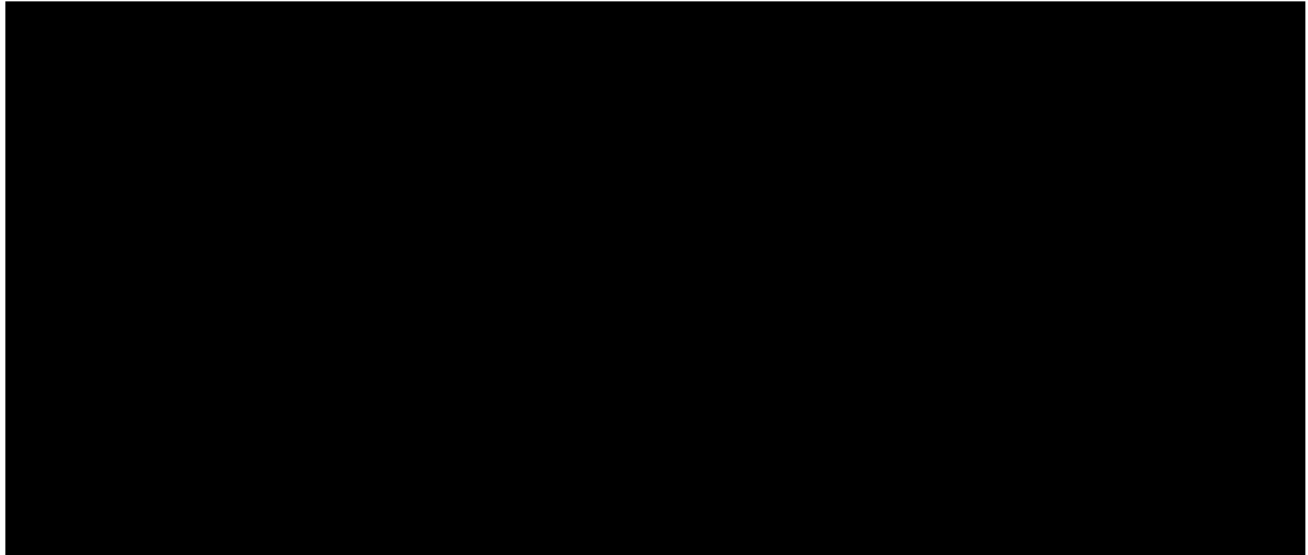
²⁶⁶ GOOG-DOJ-00569936 at -936. “Increase GDN margin on AdX from [REDACTED] (March 2014). Internal gTrade document on GDN take rate increase.

²⁶⁷ Google. “Updates to how publishers monetize with AdSense” (November 2, 2023). Accessed on September 2, 2024. <https://blog.google/products/adsense/evolving-how-publishers-monetize-with-adsense/>

²⁶⁸ GOOG-DOJ-AT-00569936 at -936. “Increase GDN margin on AdX from [REDACTED] (March 2014). Internal gTrade document on GDN take rate increase and the expected impact. (Screenshot of Expected and Measured Impact)

an overall increase in profit of [REDACTED].²⁶⁹ The document shows that it would be profitable for Google to increase Google Ads margin by [REDACTED] or more.

Figure 3

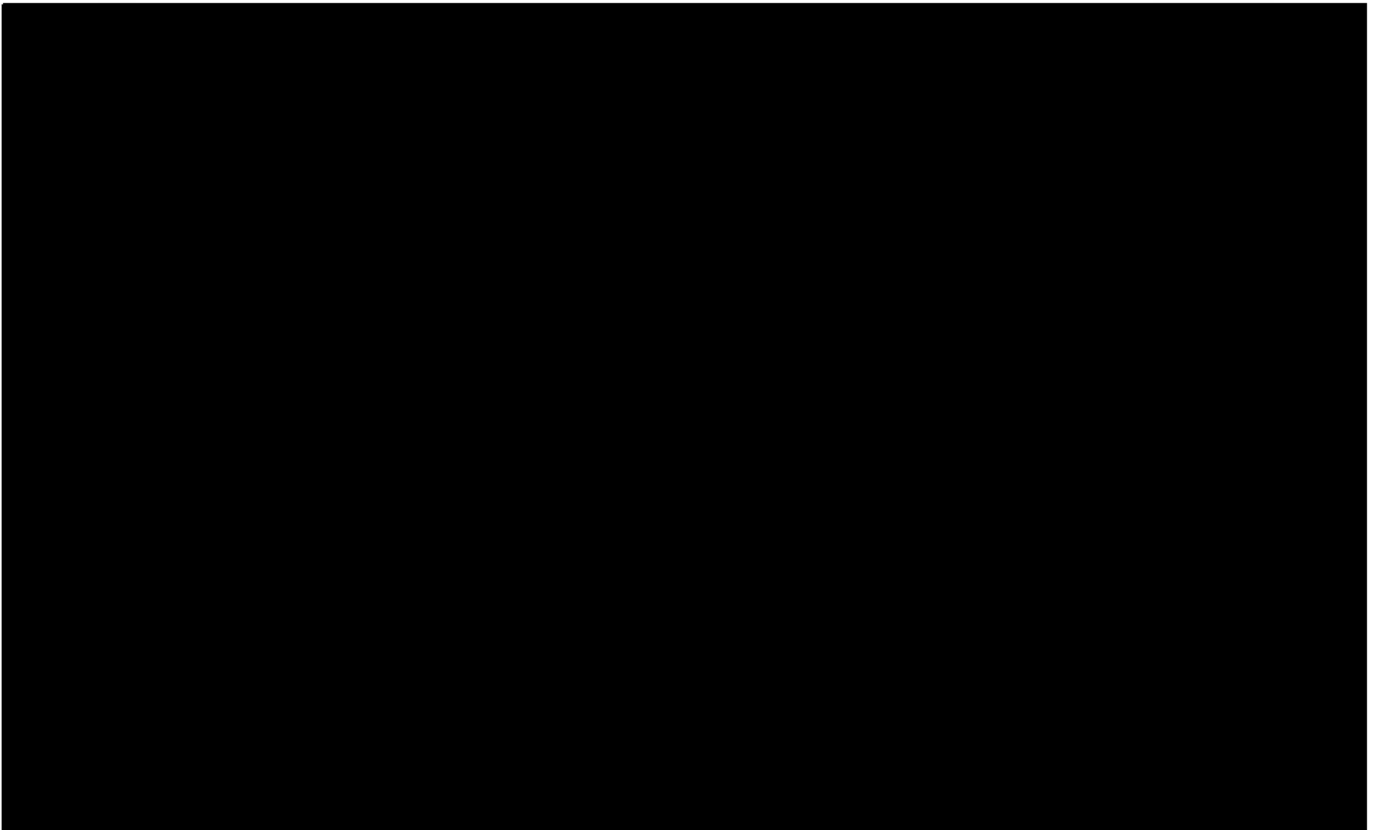


171. In addition, like other Google ad tech tools, Google price discriminates on Google Ads and DV360 across ad formats. The following table shows Google's total take rates on Google Ads by inventory type. Because the AdX take rate is approximately constant at [REDACTED] the figure shows price discrimination on the Google Ads take rates.

²⁶⁹ GOOG-NE-04732984, at -984. "Demand elasticity on AdX web publishers" (May 8, 2018). gTrade internal document on take rate increase simulation. ("At [REDACTED] buy side margin, revenue goes down [REDACTED] but the overall (buy+sell side) profit increases [REDACTED]"). See also GOOG-DOJ-AT-02118579, at -581. "Sell-side Pricing Strategy Review" (September 2018). ("simply increasing the GDN margin could generate meaningful net revenue improvements, based on an experiment with Web inventory.")

²⁷⁰ [REDACTED]

Figure 4



172. Further empirical evidence supporting the relevance of my ad buying tools for small advertisers market as separate from Walled Gardens for social media (Facebook) and shopping ads (Amazon) comes from the natural experiments I described in my original report.²⁷²

173. As explained by Gregory Leonard and Lawrence Wu, “[t]he terms ‘natural experiment’ is often used to refer to a historical market event, the outcome of which potentially allows us to distinguish between two alternative hypotheses about how the market operates.”²⁷³ Natural experiments may serve as a test of an economic theory, including to evaluate the competitive effects of an exogenous change in demand and

²⁷¹ [REDACTED]

²⁷² Gans Opening Report, ¶243 (“The Facebook Boycott in mid-2020 is a natural experiment that demonstrates the lack of switching between social advertising and display advertising. Facebook faced a backlash for hosting “damaging and divisive content.” Participating advertisers limited or stopped their spending on Facebook advertising during July 2020; however, most subsequently increased their spend on other social media outlets, such as Snapchat and Pinterest, or did not reallocate their Facebook spend.”); Gans ¶272 (“I analyzed Google data to assess whether display ad spend and spend on ads displayed on Amazon’s website (a large shopping WGP) are substitutes for advertisers. I do so by analyzing changes in display ad spend via Google ad buying tools in months with and without the Amazon Prime Day – a positive shock to ad spend on Amazon’s website.[...] The analysis shows an increase in Google display ad spending during Prime Day months compared to the same months in other year without the Prime Day, after accounting for seasonality and the increasing ad spending trend.”).

²⁷³ Leonard, Gregory K. and Wu, Lawrence Y., “Assessing the Competitive Effects of a Merger: Empirical Analysis of Price Differences Across Markets and Natural Experiments” *Antitrust* 22 (2007): 96.

therefore plays an important role in antitrust analysis.²⁷⁴ The Facebook boycott represents a sudden negative change in the demand (analogous to the exit of a competitor) for Facebook advertising that is unrelated to the determinants of the demand for web display advertising. It fits precisely the following test: if advertisers randomly were to reduce their spend on Facebook, would they allocate that spend to display instead? As such, it tests the hypothesis of substitution between the two types of ad inventory for advertisers.²⁷⁵

174. Professor Baye opines that my analyses are flawed.²⁷⁶ He presents three reasons why he believes the Facebook Boycott failed as a natural experiment, all of which show a lack of understanding of the identification strategy, the object of interest, and the environment studied. None of his criticisms apply to my analysis and, therefore, do not change my opinion. Figure 6 in my Opening Report demonstrates that there is no discontinuity in the pre-existing trend of open web display advertising spend for advertisers participating in the Facebook Boycott. This is sufficient to conclude that the boycott did not result in substitution to open web display as econometricians would not attempt to find a statistically significant effect without crude graphical evidence showing such discontinuity in the time series or panel data. To formally demonstrate the statistical conclusions in my Opening Report, I employ a regression model with several robustness checks. All specifications of this model demonstrate that there is no statistically significant effect of the Facebook Boycott on open web display advertising spend across tens of advertisers participating in the boycott. I discuss the criticisms raised by Professor Baye and these results in detail in Appendix B.

175. Similarly, I analyzed the quasi-natural experiment of Amazon Prime Days.²⁷⁷ It showed that advertisers increased their spend on display advertising during Prime Day months, suggesting no substitution and potential complementarity between Amazon Shopping ads and open web display advertising.²⁷⁸ Professor Baye calls the Amazon Prime Day shock “demand-induced” but does not provide any econometric literature justification or analysis to support his opinion that my conclusions are not correct.²⁷⁹ Rather, Professor Baye accepts the result that there is an increase in open web display spend via

²⁷⁴ Coate, Malcolm B. “The Use of Natural Experiments in Merger Analysis.” *Journal of Antitrust Enforcement* no. 2 (2013): 123–45. (“Natural experiments have the potential to test economic theories that purport to predict the competitive effects of a proposed transaction. This article provides a review of natural experiment and other examples of direct effects’ evidence identified in Federal Trade Commission (FTC) merger investigations.”)

²⁷⁵ This is analogous to the analysis of the effect of the entry of Whole Foods on competitor Wild Oats’ pricing done by the FTC’s economic expert in *FTC v Whole Foods Market, Inc.* See Leonard, Gregory K. and Wu, Lawrence Y. “Assessing the Competitive Effects of a Merger: Empirical Analysis of Price Differences Across Markets and Natural Experiments” *Antitrust* 22 (2007).

²⁷⁶ Gans Opening Report, ¶243 and Figure 6. (“Participating advertisers limited or stopped their spending on Facebook advertising during July 2020; however, most subsequently increased their spend on other social media outlets, such as Snapchat and Pinterest, or did not reallocate their Facebook spend. [...] Further, the Facebook Boycott did not lead to an increase in spend on open web display advertisements via ad buying tools for advertisers.”).

²⁷⁷ Gans Opening Report, ¶272.

²⁷⁸ Gans Opening Report, ¶272.

²⁷⁹ Baye Report, ¶262.

Google Ads during Amazon Prime Day months because “because advertisers of products featured on Amazon can reach users on the open web and direct them to Amazon for Prime Day.”²⁸⁰ This suggests complementarity. However, Professor Baye opines that this result might suggest the opposite without providing a justification for his opinion.

d) Professor Ghose’s opinions on advertising switching are not relevant to market definition

176. Professor Ghose devotes the bulk of his report to making the point that “marketers of all sizes [...] continually optimiz[e] the marketing mix” based on “analytical methods” such as Return on Investment.²⁸¹ He claims that advertisers seek to reach and influence certain target audiences for each marketing campaign. They evaluate the return per dollar of investment from various advertising channels and optimize by moving advertising dollars until the ROI in each category is equal.

177. Even if this observation were true, it is not relevant. Professor Ghose simply describes the standard economic optimization process as I just outlined above. One can find the same generic description of how consumers or firms optimize in any standard economic textbook. The basic idea is that when there are diminishing marginal returns and a budget is fixed, the rule to determine the optimal budget is to distribute dollars until the marginal benefit of each option per dollar is equal.²⁸² This is a fundamental economic principle in consumer economics and the theory of the firm. I do not dispute that this is a rational approach.²⁸³ However, as I explain below, Professor Ghose’s observations do not bear on my advertising tool market.

178. The purpose of the market definition exercise is to identify a set of products, including the product at issue, over which market power can be exercised. The products at issue in this case are tools used by small advertisers to purchase web display advertising. I undertook this analysis by beginning with the product at issue, Google Ads, and added in additional products that pose meaningful constraints on the ability of a monopolist to exercise market power profitability. My market included Taboola, Criteo, Yahoo! Advertising, and Microsoft Advertising.²⁸⁴

²⁸⁰ Baye Report, ¶262.

²⁸¹ Ghose Report, ¶115.

²⁸² Blaug, Mark. *Economic History and the History of Economics*. Brighton: Wheatsheaf (1986). Noting the logic was developed by the early neo-classical economists and presented clearly in Marshall’s 1890 *Principles of Economics*.

²⁸³ Varian, Hal, *Microeconomic Analysis*, 3rd Ed., 1992, Norton.

²⁸⁴ Gans Opening Report, ¶229 (“Today, other participants include Taboola, Criteo, Yahoo, and Microsoft. These market participants provide software that allows advertisers to purchase advertising space on open web publisher sites. These competitors offer open web display buying capabilities to small advertisers.”)

179. Professor Ghose's contention that advertisers optimize their advertising budgets using a performance measure provides little useful information by itself that is relevant to the market definition exercise for advertising tools.^{285, 286, 287} An analogy illustrates why this is so. Suppose Haagen Daz ice cream raises its price. In response to the claim that there is market power in ice cream, a food buying expert claims that consumers of food have a set food budget that they allocate between numerous food items, including meat produce, cereal, and other products until the marginal utility per dollar for all categories is equal.²⁸⁸ Yet none of this evidence would be relevant to whether ice cream is a relevant product market. Indeed, in a 2022 investigation, the Federal Trade Commission concluded that the super-premium ice cream was a relevant product market.²⁸⁹ Moreover, ready-to-eat cereal was also found to be a relevant product market.²⁹⁰ The point is that budget allocation between products is irrelevant to market definition and merely serves to elevate distinct substitutes into an overly broad market.

180. Further comparison to the HMT approach illuminates this point. Suppose a 5% increase in the AdX take rate translated into a 1.3% increase in the cost of a display ad, assuming that the advertisers, and not the publishers, paid the entire take rate increase. This increase can be translated into an equivalent CPM increase for display that is, first of all, minimal, even under this very conservative assumption. The advertiser's display ROI (sales conversions – marketing cost/marketing cost) for the same amount of display impressions is then reduced.²⁹¹ However, this does not imply that it is optimal for the advertiser to reallocate spend to other channels. The reallocation amount, if any, depends on the shape of the ROI

²⁸⁵ Movement of budget dollars also does not tell us the firm is moving its budget between substitutes or complements. For example, in a standard production function analysis, the producer will use the equal marginal rule to distribute investment across complementary inputs.

²⁸⁶ *United States v. Google*, No. 20-cv-3010, page 174. (D.D.C. Aug. 5, 2024) (“[Google] contends that advertisers care more about ROI or return on ad spend (ROAS) than any particular advertising channel, and that they move ad spend across different channels to maximize their ROI. [...] But Google's focus on ROI misses the forest for the trees. Products are reasonably interchangeable only if “significant” substitution occurs in response to a price increase. *See Ohio v. Am. Express Co.*, 585 U.S. 529, 543–44 (2018)”).

²⁸⁷ *United States v. Google*, No. 20-cv-3010, page 175 (D.D.C. Aug. 5, 2024) (Mehta, J.). (“Campaign goals may require a different blend of complementary advertising types to further a firm's objectives. [...] *FTC v. IQVIA Holdings Inc.*, No. 23-cv-06188 (ER), 2024 WL 81232, at *17 (S.D.N.Y. Jan. 8, 2024) (“An agency running an advertising campaign will not have an unlimited budget, so it must make decisions about how to allocate the advertising funds it has. But the fact that [search] competes with these channels for advertising dollars in a broader market does not necessarily mean those channels are reasonably interchangeable substitutes that must be included in the relevant product market.”).”)

²⁸⁸ Professor Ghose basically admits this problem when he states that “the fact that different display ad formats can have different price points (i.e., higher or lower CPMs) does not preclude advertisers from considering and using them as viable alternatives while they engage in budget allocation and reallocation.” (*See Ghose Report*, ¶36)

²⁸⁹ Analysis of Proposed Consent Order, Nestle Holdings, Inc. No. 21-0174 (June 25, 2003)

²⁹⁰ Rubinfeld Daniel L. “Market Definition with Differentiated Products: The Post/Nabisco Cereal Merger” *Antitrust Law Journal* 68, 163 (2000). (“The State maintained that the relevant market included only “Adult” RTE cereals, whereas Kraft maintained that the market included, at a minimum, all RTE cereals.”).

²⁹¹ Sales conversions are an increasing and concave function of the impressions purchased (*See Lee, Alec M.*, “Decision rules for media scheduling: static campaigns.” *OR* 13, no.3. (1962); 229. (“The first of these is that the size and attention value of an advertisement are related by the square root rule: (1) An advertisement of size = z^2 in any publication is seen by a proportion z of the readers of that publication. This assumption is based upon some experimental work carried out by London Press Exchange and implies that an advertisement of size 1, that is a whole page, is seen by every reader of a publication “). The marketing cost is the channel's CPM multiplied by the number of impressions purchased times 1,000.

functions for each channel.²⁹² Importantly, marketers face uncertainty about the ROI of advertising, and only large ROI changes result in the reallocation of budget dollars.^{293,294}

181. Several studies suggest that advertisers' use of ROI is an imprecise science. This implies that small changes in the cost of a particular ad format would not trigger switching between formats. For example, a 2023 Nielsen industry report states that "only 54% of marketers are confident in ROI measurement across digital channels."²⁹⁵ According to a 2022 Deloitte report, advertising professionals struggle to measure performance due to the declining volume and availability of customer and media performance data. Additionally, advertising agencies often lack access to the company data needed to connect campaign performance to business results.²⁹⁶ Contributing to this lack of confidence is the ambiguity surrounding "data points and attribution of monetary value in customer journeys".²⁹⁷ A BCG industry report further highlights that only 5% of CMOs have access to high-quality performance data,²⁹⁸ rendering ROI an unreliable indicator for decision-making.

182. Deponents in this case confirm the difficulty of calculating ROI. In its deposition, [REDACTED] representative stated that it had many teams "constantly running tests" on various metrics, including ROI, which requires large budgets and labor.²⁹⁹ Several Google documents also acknowledge Google products'

²⁹² The ROI function for a given channel is reasonably represented by a step function with discontinuities resulting from level changes in ROI when spend is made on a new targeting group.

²⁹³ Randall A Lewis, Justin M Rao, "The Unfavorable Economics of Measuring the Returns to Advertising," *The Quarterly Journal of Economics* (2015): 1941-1973; *United States v. Google*, No. 20-cv-3010, page 77 (D.D.C. Aug. 5, 2024) (Mehta, J.) ("But it is challenging for advertisers to calculate ROI and ROAS.")

²⁹⁴ Professor Ghose's paper "Informational Challenges in Omnichannel Marketing: Remedies and Future Research" states that attribution of conversion to specific ads can be difficult or even impossible. See Haitao, Tony Cui, Anindya Ghose, Hanna Halaburda, Raghuram Iyengar, Koen Pauwels, S. Sriram, Catherine Tucker, and Sriraman Venkataraman. "Informational Challenges in Omnichannel Marketing: Remedies and Future Research." *Journal of Marketing* 85, No. 1 (2021): pp. 103-12.

²⁹⁵ Nielsen. "2023 Annual Marketing Report." (December 2022). Accessed on September 2, 2024.

<https://www.nielsen.com/insights/2023/need-for-consistent-measurement-2023-nielsen-annual-marketing-report/>.

²⁹⁶ Nelson, Ken and Kathleen Ollen. "Connecting Marketing KPIs to Business Objectives." Deloitte Digital. (September 22, 2022). Accessed on September 3, 2024.

<https://www.deloittedigital.com/content/dam/digital/global/legacy/documents/offering/offering-20220928-measurement-series-part-1.pdf> ("But recent changes at the device, browser and regulatory levels have diminished both the volume and availability of third-party customer and media performance data available to help marketers activate, measure and improve performance. This signal loss is having a real effect on the performance metrics that brands can effectively track.")

²⁹⁷ Forbes Technology Council. "Marketing ROI: Three Foundational Rules for Successful Measuring." (February 29, 2024). Accessed on September 3, 2024. <https://www.forbes.com/councils/forbestechcouncil/2024/02/29/marketing-roi-three-foundational-rules-for-successful-measuring/> ("Marketers measure return on investment (ROI) to evaluate the effectiveness of their campaigns and allocated resources. Calculating ROI on marketing spend requires careful consideration of various data points and upfront strategy. What makes the calculation process complicated is data points and attribution of monetary value in customer journeys.")

²⁹⁸ BCG. "Measure to Grow: Drive Double-Digit Growth by Measuring Marketing Right." (November 15, 2021). Accessed on September 3, 2024 <https://www.bcg.com/measuring-digital-marketing-to-drive-growth> ("Only 5% have high-quality data that enables key business decisions")

²⁹⁹ [REDACTED]

shortcomings limiting especially small advertisers' ability to measure returns across channels and campaigns.³⁰⁰

183. In his Rebuttal Report, Professor Chandler also explains that measuring ROI is "an extraordinarily difficult challenge."³⁰¹ He describes the difficulty for advertisers to switch budgets across advertising channels,³⁰² especially as many advertisers lack the sophistication required to do so.³⁰³

184. A 2018 Google survey also shows that around a quarter of respondents do not evaluate ROI for search advertising.³⁰⁴ The top reasons for not tracking ROI included the difficulty of tracking the data to measure ROI attributable to a specific sale, the lack of data access.³⁰⁵ Some advertisers also responded that they did not place a high importance on ROI. The advertiser HV explained: "it's difficult to do one-to-one ratio" of revenue generated and that "with brand building, the return is zero."³⁰⁶

185. Another problem that Professor Chandler discusses is that switching between ad formats may not be possible because of the target audience at issue in a campaign.³⁰⁷ Professor Ghose never shows that

³⁰⁰ See for example GOOG-AT-MDL-C-000056931 at -7187. "DVAA 2017 Strategy Book" (2017). ("No full funnel optimization - because there are disparate campaigns for each channel, advertisers cannot easily do measurement, attribution, optimization across the funnel. As a result, many resort to just focusing on funnel marketing tactics such as Search and Remarketing. [...] Mobile is a barrier for 3P measurement companies. 3Ps (NCS, IRI, Kantar, etc.) cannot accurately measure mobile without deeper integrations with publishers."); GOOG-AT-MDL-C-000008293 at -313. "DVAA Leadership Strategy Offsite" (2018). ("Related, [agencies'] ability to create a single view of a user across devices and channels has become even more difficult with measurement fragmentation, particularly within walled gardens. Reaching the right user and allocating spend based on accurate ROI is becoming more difficult."); GOOG-DOJ-17941508 at -530. "AdWords User Experience Research" (November 7, 2013). Google Presentation on AdWords User Experience Research. (Presentation on advertisers' pain points showing examples of many advertisers that don't "know how to evaluate AdWords ROI" and that small advertisers have "little ability to accurately calculate ROI for AdWords." Common pain points include "Tracking ROI is difficult due to offline conversions" and "I need better ways to calculate multiple channel attribution.")

³⁰¹ See Chandler Rebuttal Report, ¶ 68. ("Multi-channel measurement is an extraordinarily difficult challenge. Advertising firms are not ideal theoretical spaces in which advertisers play out optimal responses. Advertisers operate with a wide range of skill levels for analysis, with very few capable of the kind of optimization analysis that the Ghose Report posits. Even with a highly skilled team, multi-channel measurement is the kind of problem that is deeply complex and difficult, as I have detailed in my Opening Report.")

³⁰² See Chandler Rebuttal Report, ¶ 61. ("The Baye Report mistakenly argues that switching advertising channels comes at a minimal cost. [...] Digital marketers specialize in different forms of advertising.³⁰² It is not simply a matter of switching what kinds of ads a company places, although the difference between producing a text ad and a video ad is substantial. It is also a matter of learning how different ads work.")

³⁰³ See Chandler Rebuttal Report, ¶ 71. ("First, the Milgrom Report assumes high levels of sophistication among all advertisers and publishers. In reality, advertising sophistication mimics advertising budgets and is a power-law distribution.")

³⁰⁴ GOOG-NE-10873225 at -230. "Perceptions of ROI: CX Lab Final Insights Deck" (Undated). Presentation summarizing the results of a 3-part longitudinal study conducted from February 2018 to July 2019 to understand what ROI and Search performance means to advertisers, how they measure it and monitor it.

³⁰⁵ GOOG-NE-10873225 at -270. "Perceptions of ROI: CX Lab Final Insights Deck" (Undated). Presentation summarizing the results of a 3-part longitudinal study conducted from February 2018 to July 2019 to understand what ROI and Search performance means to advertisers, how they measure it and monitor it.

³⁰⁶ GOOG-NE-10873225 at -271. "Perceptions of ROI: CX Lab Final Insights Deck" (Undated). Presentation summarizing the results of a 3-part longitudinal study conducted from February 2018 to July 2019 to understand what ROI and Search performance means to advertisers, how they measure it and monitor it.

³⁰⁷ See Chandler Rebuttal Report, ¶ 41. ("Regardless of channel pricing, marketers maintain presences in different channels because they have different audiences, different costs, and different effects.")

minimal changes in cost would trigger a diversion of the advertising budget between ad formats. Deposition testimony by advertisers in this case confirms this fact.³⁰⁸

186. In contrast to the advertiser deponents in this case, Professor Ghose appears to claim that advertising channels are like undifferentiated commodities because “the populations of ‘open web’ and social media users have largely converged over time,” that “the populations of ‘open web’ and app users do not appear to be as distinct,” and that “there is also a large overlap between users of video apps and social media platforms.”³⁰⁹ This “direct overlap of the populations”³¹⁰ between advertising channels makes them substitutable. He devotes numerous pages to detailing how market trends such as the rapid consumer adoption of mobile devices, the growing adoption of social media websites and apps, retailer self-service platforms, and Connected TV services have led to overlap in audiences and thus substitution from advertisers.³¹¹ Nonetheless, Professor Ghose’s premise is not correct.^{312,313,314}

187. Even if firms do move budgets between advertising formats, the fact that advertisers switch between advertising categories also does not inform us whether a market power is being exercised in display

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³⁰⁹ Ghose Report, ¶33.

³¹⁰ Ghose Report, ¶33.

³¹¹ I note that in his 2017 book, Professor Ghose implies that the evolution of the mobile landscape does not necessarily translate to consumer behavior. He states: “Even with the rise of mobile devices, there are still many transactions that consumers prefer to do on a computer!” See Ghose, Anindya. *Tap: Unlocking the Mobile Economy*, MIT Press (2017): 166.

³¹² *United States v. Google*. No. 20-cv-3010, page 173, (D.D.C. Aug. 5, 2024) (Mehta, J.) (“Google argues that the market should be defined based on the degree of audience overlap.”).

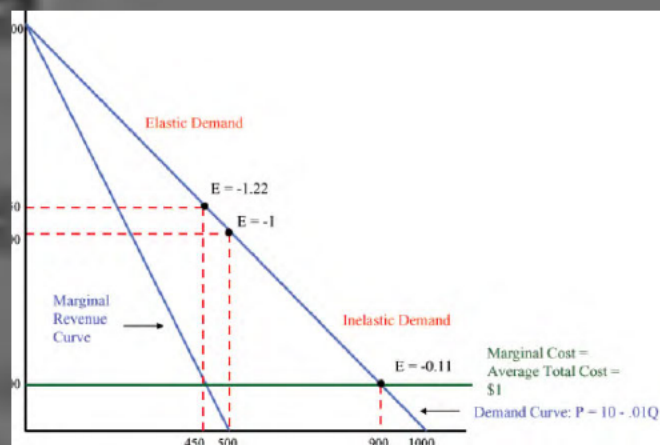
³¹³ *United States v. Google*. No. 20-cv-3010, , page 173, (D.D.C. Aug. 5, 2024) (Mehta, J.) (“This argument misses the point. [...] Nor is there anything inconsistent about treating search ads and ads on other platforms, like social media, as distinct products even though they have overlapping audiences. Marketers use them as complements to fulfill their ultimate objective: to drive sales”).

³¹⁴ On linking market trends to substitution patterns, the court further opined: “To the extent that ad dollars are increasingly being spent on other channels, that change reflects the ballooning of the digital advertising market as a whole. [...] There is no evidence that the massive growth of social media ads, for example, has come at the expense of search ads.”³¹⁴ In other words, overlap in audience does not inform substitution patterns but rather suggest the needs for advertisers to adapt their marketing strategies.

advertising. The observation of switching at prevailing prices can falsely lead to overly broad markets. This is the famous Cellophane Fallacy.

188. The Department of Justice defines the Cellophane Fallacy as “undertaking a market definition analysis at monopolistic prices [which] can lead one to define too broad a market and fail to identify market power when it is present.”³¹⁵ The Department of Justice provides the below illustration of an example of the Cellophane Fallacy. The example shows that as prices rise and one moves up the demand curve, demand becomes more elastic indicating that more switching between products occurs in response to price increases.

Figure 5
Illustration of the Cellophane Fallacy by the Department of Justice³¹⁶



189. Professor Ghose’s analysis is also irrelevant for the independent reason that I have defined a market for ad buying tools, not a category of advertising. Like Professor Baye, Professor Ghose’s analysis is aimed at a strawman, not my analysis. Thus, Professor Ghose’s opinion is not relevant to my market opinion or this case. Consider the market for ad buying tools for small advertisers. In this market, Google Ads and other small buyer tools can be used to purchase advertising in several categories including display, in-app inventory, video inventory, connected TV inventory and search. Google charges a take rate for this service, and price discriminates between advertising categories. If advertisers divert their budget away from display ads, they can use Google Ads to do so. When advertisers switch from using Google Ads, Google recaptures the benefit of these purchases of other advertising formats. Thus, switching advertising categories will not undermine the profitability of a price increase by an ad buying tool.

³¹⁵ Department of Justice, Monopoly Power, Market Definition, and the Cellophane Fallacy. (Undated) Accessed August 5, 2024. <https://www.justice.gov/archives/atr/monopoly-power-market-definition-and-cellophane-fallacy>

³¹⁶ Department of Justice, Monopoly Power, Market Definition, and the Cellophane Fallacy. (Undated) Accessed August 5, 2024. <https://www.justice.gov/archives/atr/monopoly-power-market-definition-and-cellophane-fallacy>

190. Professor Simonson makes essentially the same errors as Professor Ghose and, therefore, does not conduct a SSNIP test. Professor Simonson's findings are not relevant to my tool-based market. His findings are also irrelevant to my opinion on this case. Professor Simonson conducts three surveys. One survey covers small advertisers, a second surveys large advertisers and a third survey addresses advertiser agencies. Three questions appear to be directed at market definition. These were:

Figure 6
Professor Simonson's Survey Instructions

Q5. Please read carefully. Now suppose that, based on your analysis, the cost of programmatic display advertising has recently increased by a small but significant amount, and will remain elevated for the foreseeable future. Assume further that, based on similar analyses for other digital advertising types, the costs of other digital advertising types have not changed and are not expected to change.

So if the cost of programmatic display advertising increases (while the cost of other advertising types remains the same), will you or won't you divert some of your advertising spending for the coming year to other types of digital advertising?

Q6. To which other types of digital advertising below, if any, would you divert your advertising spending for the coming year as a result of the increase in the cost of programmatic display advertising?⁶⁶

To review the advertising type descriptions, hover your mouse over each digital advertising type.

Q7. In your previous answer, you indicated that the increase in the cost of programmatic display advertising will lead you to divert some of your advertising spending to the types of digital advertising listed below.

Please use the sliders below to indicate, on a scale of **0** to **10**, the extent to which you would divert (that is, increase) advertising spending for the coming year to **each type of digital advertising** that you just indicated.

For each digital advertising type below, please select **0** if you expect to keep spending on that type of digital advertising for the coming year and **10** if you expect to substantially increase spending on that type of digital advertising.

191. The first question asks respondents to decide for themselves the amount of a "small but significant" price increase. Then in question 6 respondents were asked whether they would divert budget spending away from display advertising to other advertising categories. Then respondents were asked to rank on a scale from 1 to 10 how much spending would be diverted. Respondents themselves decided what the measure 1 to 10 meant. The results are tabulated in the table below.

Table 7
Professor Simonson's survey responses summary³¹⁷

Advertising Type	Large Advertiser			Small Advertiser			Agency		
	No. Respondent Diverted	Percent of Total that Diverted	Average Score	No. Respondent Diverted	Percent of Total that Diverted	Average Score	No. Respondent Diverted	Percent of Total that Diverted	Average Score
Social	159	32%	6.60	108	36%	8.00	128	34%	6.91
Search	157	31%	6.81	79	26%	7.91	93	24%	6.72
Digital Video	125	25%	6.79	74	25%	7.79	82	22%	6.60
ecommerce Platform	101	20%	7.16	62	21%	7.79	77	20%	7.32
Connected TV	99	20%	6.90	59	20%	7.52	73	19%	6.78
Email	95	19%	6.92	79	26%	7.42	54	14%	6.77
App/In-app	80	16%	7.72	54	18%	7.77	47	12%	7.21
Digital Audio	74	15%	7.19	75	25%	7.81	53	14%	6.97
Other	2	0%	5.02	1	0%	9.06	1	0%	3.81

192. Before turning to the results, it is important to understand that nothing of relevance for market definition (even the strawman display advertising non-tool market) can be derived from these numbers. This is true for three reasons. First, the survey assumes prevailing pricing which can result in the Cellophane Fallacy. Second, each subject can decide for themselves or herself what a cost increase means (cost per CPM, take rate increase, ROI change, etc.), or how much is a significant increase. Third, the diversion amounts are not dollar amounts but qualitative descriptions. From this information, it is impossible to draw any conclusions about which advertising formats, if any, constrain the ability to exercise market power in advertising buyer tools.

193. Despite these infirmities, Professor Simonson's results are truly unremarkable. For example, potentially very large cost changes result in modest switching. For example, only 12% of ad agencies switch budget from display to in-app ads.³¹⁸ Professor Ghose does not comment on the diversion he finds to search advertising. Adding search advertising to the market would significantly increase Google's market share. I find these results as a whole both unreliable and uninformative.

IV. MARKET POWER

194. Professor Baye makes a definitive (but, as I will show, unsupported) claim that "Google does not have monopoly power."³¹⁹ I take this statement to be one that relates to the display advertising industry as in this matter rather than Google's position in other markets, including web search, search advertising, streaming video, mobile operating systems, web browsers, self-driving cars, home products such as

³¹⁷ The table is derived from questions 5, 6, and 7 in the Simonson survey report. The 'Percent of Total Diverted' column represents the proportion of total respondents who indicated they would divert some portion of their spending to the other tech advertised option. The 'Average Score' column shows the mean score across all respondents, with a score of zero assumed for those who indicated they would not divert their spending.

³¹⁸ See Table 7.

³¹⁹ Baye Report, Section VII.

thermostats, cloud computing, artificial intelligence chips and products, enterprise software, and email tools. However, I note that, in my reading of his report, and distinct from the criticisms he levels at my conclusions, Professor Baye, where he presents details, offers a weaker claim. What he actually claims is that the evidence is consistent with Google not having monopoly power rather than a definitive finding that Google has no monopoly power.

195. In my Opening Report, I presented my opinions and the evidence that Google possessed substantial monopoly power in three relevant antitrust markets in which the conduct at issue in this matter occurred. In so doing, I considered substitution and other possibilities that would have led to a different conclusion. There, I found that the evidence taken as a whole did not indicate that other factors would limit the conclusions I reached regarding Google's monopoly power.

196. Professor Baye makes many, often competing claims in his analysis of Google's monopoly and it is challenging to distill his conflicting opinions. For instance, throughout his discussion of market power, Professor Baye, when claiming to provide an analysis based on my market definition (which he does not strictly follow even in those cases and does not agree with), often reverts back to the very same claims regarding substitution and multi-homing that he claimed rendered my market definition conclusions incorrect. Rather than repeat my opinions already made regarding why Professor Baye is incorrect in his assessment of my market definition conclusions, I will note that, if my market definition conclusions are accepted, Professor Baye's claims of a lack of monopoly power lack merits.

197. In addition, Professor Baye often confuses the presence of monopoly power with a claim that monopoly power is illegitimately acquired. For instance, he suggests that Google may have high market shares if its product quality is superior to others in a market. When assessing whether a firm has monopoly power or not, it is irrelevant whether that monopoly power arose from having advantages (through product quality, product differentiation or factors such as holding unique proprietary technology or data, or being able to harness network effects), regulatory assignment (e.g., patents or copyrights) or from illegal antitrust actions. All of those factors can provide the firm with monopoly power. Monopoly power (regardless of how acquired) in this case is a pre-requisite for understanding how Google had the ability to use that power, through conduct identified in this matter, as a means of acquiring additional monopoly power or preserving its market power.

198. Throughout his analysis of monopoly power, Professor Baye confuses these concepts and contradicts himself. At one point, he opines that Google has a high market share from its superior quality.³²⁰

³²⁰ Baye Report, ¶393, 349.

At a later point, he claims that Google has a low market share, which then naturally implies that he is claiming that Google has lower product quality.³²¹ Similarly, Professor Baye opines that Google's high market share may reflect indirect network effects³²² before claiming Google has a low market share (or entry),³²³ which would suggest that Google was not internalizing indirect network effects, let alone providing benefits to its customers as a result of them.

199. In what follows, I respond to Professor Baye's claims that are not hopelessly internally inconsistent. Thus, I will examine Professor Baye's claims that (1) I do not credit the alleged direct evidence of output, prices or quality; (2) my market shares are too high; (3) market shares may not be a good proxy for market power; and (4) I ignore advertiser and publisher multi-homing. I note that I find all of these claims unfounded.

A. Responses to Professor Baye's claims direct evidence of Google's monopoly power

200. In my Opening Report, I showed that while Google's ad exchange competitors not only charge lower take rates but have reduced their take rates over time, AdX has managed to increase its market share over the years³²⁴ while sustaining a take rate above other exchanges.³²⁵ Below, I provide an updated chart comparing AdX and ad exchange competitors' take rates enhanced by data made available after the submission of my Opening Report.³²⁶ These additional data only strengthen my original conclusions.

201. After the submission of my Opening Report, I received access to new third-party data productions. Below, I present a graphical comparison between AdX's take rate and other ad exchanges supplementing the numbers in Table 8 of my Opening Report.

³²¹ Baye Report, ¶440.

³²² Baye Report, ¶344.

³²³ Baye Report, ¶345.

³²⁴ Gans Opening Report, Table 5.

³²⁵ Gans Opening Report, Table 8. *Also see* Figure 7 in this report.

³²⁶ See Appendix C.2.

Figure 7

202. These numbers show that, while other exchanges are competing, AdX appears unaffected by price changes by its competitors.

203. Professor Baye does not address this fact and the evidence presented in my report at all. In fact, Professor Baye claims that I provide no direct evidence of monopoly power which, in consideration of the evidence above, is inaccurate.³²⁷ Instead, Professor Baye presents a naïve opinion that the growth of display advertising spend in the U.S. since 2010 – due to the expansion of the Internet and associated online services – is evidence that Google does not have monopoly power.³²⁸ He also presents dubious evidence of prices and quality of Google’s products.³²⁹

1. Professor Baye’s claims about output increases are not relevant

204. Professor Baye opines that the growth of digital advertising demonstrates that all the markets are competitive.³³⁰ This is not true. The error is that Professor Baye does not define a baseline situation, or in the parlance of antitrust economics, he does not define the “but for” world. Growth can occur when market power is exercised, but such growth will be smaller than the growth that would occur if there were competitive markets. In other words, growth would have been higher absent Google’s monopoly power. Growth does not establish competition. In fact, when output is increasing, under standard assumptions, demand elasticity falls making the ability to raise prices easier.³³¹ Further, an increase in the amount of

³²⁷ Baye Report, ¶288.

³²⁸ Baye Report, ¶289.

³²⁹ Baye Report, ¶290, ¶291, ¶292.

³³⁰ Baye Report, ¶289.

³³¹ Demand elasticity is defined as: $E = (dq/dp) * (p/q)$. Under the standard features of supply and demand, an outward shift in supply results both in a higher equilibrium quantity and a new equilibrium where the demand curve is more inelastic. *See* Carlton, Dennis W; Perloff, Jeffrey M. “Modern Industrial Organization”. 4th Ed. Pg. 65. 4th Ed. Pg. 65. (“The technical definition of the price elasticity is $(p/Q)(dQ/dp)$.[...] In general, the elasticities of demand and supply depend upon many economic factors, such

advertising may not correlate with increased revenues for publishers or ROI for advertisers – i.e., social welfare in the industry.³³²

205. For the above reasons, a reduction in output is not required in economic theory to demonstrate market power,³³³ especially in industries where marginal costs are near zero.^{334,335}

2. Professor Baye's claim that Google's prices have decreased is incorrect

206. Professor Baye opines that the prices of Google Ads, DV360 and DFP have decreased over time.³³⁶ This is not true. First, I have calculated Google's total margin for display advertising tools across the ad tech stack both from the perspective of Google Ads advertisers and DV360 advertisers, which shows that Google's total margin has remained relatively constant over time (see Figure 8). Second, the Baye Report conveniently presents DFP fees on a per-unit basis which masks the overall amount of fees paid by publishers.³³⁷ Third, the Baye Report presents AdX's fees combining transaction types with very distinct prices, some of which are not relevant for the market at issue (see Figure 29).

as the level of output, the availability of substitute products, and the ease with which supplies can alter production. For example, as more substitute products are available consumers find it easier to substitute for a product if its price rises, which makes its demand curve more elastic.”)

³³² Newman, John M. "The Output-Welfare Fallacy: A Modern Antitrust Paradox." *Iowa L. Rev.* 107 (2021): 563. (“Once again, output may increase while consumer welfare—whether defined broadly or narrowly—decreases”).

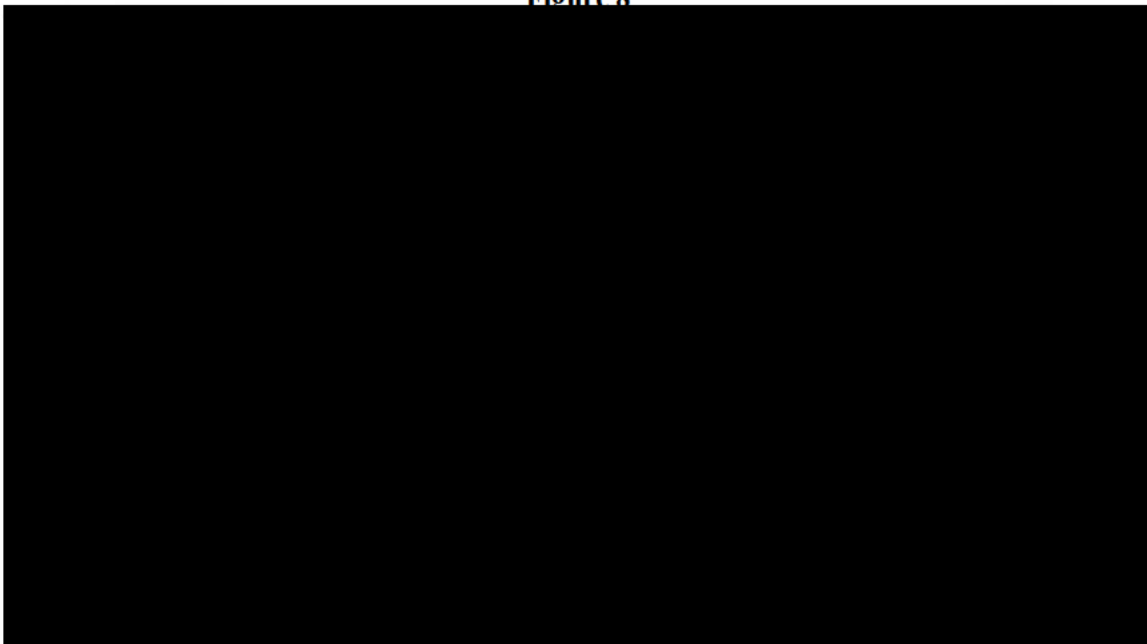
³³³ See *United States v. Google*. No. 20-cv-3010, 2024, page 161. (“But restricted output is simply a form of direct proof. Its absence is not fatal, as indirect evidence suffices to establish monopoly power. See *Mylan Pharms. Inc. v. Warner Chilcott Pub. Ltd. Co.*, 838 F.3d 421, 435–36 (3d Cir. 2016) (treating as direct evidence the absence of “markedly restricted output” but then evaluating indirect evidence of monopoly power).”)

³³⁴ *United States v. Google*. No. 20-cv-3010, 2024, page 164, 165. (“Also, reduced output is an ill-fitting indicia of monopoly power in a market like search. Google’s marginal cost of responding to one additional query is near zero. In such a market, a dominant firm has no incentive to restrict output to earn monopoly profits. See H. Øverby & Jan Arlid Audestad, *Introduction To Digital Economics* § 6.2 (2d ed. 2021) (For a digital good like search, “because the marginal cost is zero and [] there is no limit to the number of units that can be produced without increasing the fixed costs[,] . . . the cost per unit produced will be zero independently of the production volume.”); cf. *Pac. Eng’g & Prod. Co. of Nev. v. Kerr-McGee Corp.*, 551 F.2d 790, 796 (10th Cir. 1977) (recognizing that in the face of “decreasing marginal costs,” a firm “would be tempted to lower price and expand output to reach a lower point on its marginal cost curve”). So, the fact that search output has grown is not inconsistent with monopoly power in search.”)

³³⁵ Professor Baye himself acknowledges that ad tech markets exhibit low marginal costs. See Baye Report, ¶145.

³³⁶ Baye Report, ¶23, 24.

³³⁷ Baye Report, Exhibit 4.

Figure 8

207. Figure 8 is the total surplus that Google extracts from buyers and sellers of display advertising. It is remarkably stable. Despite Professor Baye's claims about dynamic competition, growth of advertiser competition, entry, etc., Google consistently imposes about [REDACTED] total take rate on participants in the relevant markets. This is the hallmark of a firm with monopoly power.

208. An important component of this overall margin is the AdX take rate, which has remained, on average, largely constant around [REDACTED] over time, as I show in my Opening Report.³³⁹ Professor Baye presents a distorted picture of Google's exchange fees in Exhibit 3 of his report. The small reduction in the Google fee he presents is due to a composition effect: Professor Baye has added preferred deals and guaranteed transactions, which I explained in my Opening Report, are not part of the relevant market, to his calculations (see Appendix E.2).³⁴⁰

209. Moreover, Exhibit 4 in Professor Baye's report presents a distorted picture of ad serving fees because Professor Baye chooses to report fees on a per unit basis. There is no reason to analyze the costs incurred by publishers to serve ads on a per unit basis. As shown in Table 11 (Appendix D.1.), DFP charges several types of fees, all separately reported in the data used by Professor Baye in his analysis. Some of these fees are monthly subscription charges (e.g., Monthly fee), others are single charges for one-shot services (e.g., Data transfer fee) and others are charges per impressions served (e.g., Serving fee and Uplift

³³⁸ [REDACTED]

³³⁹ Gans Opening Report, Figure 33, Panel B. Transaction type is Open Auction to reflect the relevant channel for competition between ad exchanges for indirectly sold impressions.

³⁴⁰ See Appendix C.

fee).³⁴¹ Table 13 in Appendix D shows that the total fee paid by DFP's paying customers oscillates between [REDACTED] per year and has remained stable over time. In fact, the table also shows that DFP yearly revenues have systematically grown since 2014. Professor Baye also cites to a Google document from 2010 saying that ad serving fees have "declined steeply" since April 2008.³⁴² Right after the quote highlighted by Professor Baye, the same slide states that, in the U.S., DFP sells at a "[REDACTED] premium over competitors," demonstrating DFP's market power even in those early years. The slide also admits that the price reduction following the acquisition and technical integration between DFP and AdX³⁴³ is an "opportunity to utilize DFP to drive AdX adoption."

210. Exhibit 5 in Professor Baye's report is irrelevant to the issue of fees charged by Google. It shows that fewer display advertising dollars have been spent for a click since approximately 2011. Professor Baye's exhibit shows that the amount Google Ads advertisers were willing to pay for a display click grew substantially from just under [REDACTED] per click in January 2005, to about [REDACTED] in late 2009. Cost per click then stabilizes until late 2011 and then starts falling systematically until 2023. This exhibit speaks to structural industry changes affecting the value of a display click to Google Ads advertisers. This change in trend is more likely to reflect the increase in the supply of display inventory over time, with the expansion of the Internet, than changes in fees charged by Google. As shown in Figure 8 above, total buy-side and ad exchange fees have remained stable when measured from the perspective of Google Ads advertisers.

211. Additionally, Google data contradicts Professor Baye's assertion that Google's vertical integration across ad tech tools reduces double-marginalization and, consequently, total fees.³⁴⁴ First, Figure 8 show that Google's total fees are constant if not increasing over time. Second, Google's ad buying tool, which is more integrated with AdX (Google Ads), charges higher fees than Google's less integrated ad buying tool

³⁴¹ GOOG-AT-MDL-008928515 at -518. "DFP FAQ" (February 2020). Internal Google fact sheet providing an overview of fees.

³⁴² Baye Report, ¶415 and footnote 711

³⁴³ See Gans Opening Report, section VI.B.4.

³⁴⁴ Professor Baye opines "One of the important benefits of managing a production process as an integrated whole rather than as independent stages is that it eliminates double marginalization. It is well-documented in both the theoretical and empirical literatures in economics that the elimination of double marginalization ("EDM") results in lower prices and greater output." See Baye Report, FN 392. Elhauge finds that there are conditions under which tying can increase monopoly profits without any efficiencies; (1) if buyers use varying amounts of the tied product, (2) if there is not strong positive demand correlation across both products, (3) if there is not fixed market competitiveness in the up or downstream markets. As argued in my Opening Report Google maintains a monopoly in both the tied and tying markets and thus efficiencies such as EDM may not arise from its vertical integration. Similarly in a paper cited by Baye, Kwoka and Slade state that there are many circumstances in which elimination of double marginalization may not hold including multi-product firms, when firms have the incentive and ability to disadvantage downstream rivals, and when integrated firms do not set an internal transfer price. See Kwoka, John and Margaret Slade, "Second Thoughts on Double Marginalization," *Antitrust*, Vol. 34, No. 2 (2019): 51-56. Google offers products in multiple Display Advertising Markets I have delineated, has an incentive to raise rivals cost and has acted on this incentive, and does not set an internal transfer price between DFP and AdX. Baye does not analyze the conditions described by Elhauge or Kwoka and Slade, despite citing Kwoka and Slade, and simply assumes that EDM holds, despite prima facie evidence suggesting that conditions under which EDM does not hold are satisfied.

(DV360). Figures 15 and 32 show the volume of impressions purchased by Google Ads and DV360 advertisers via AdX versus third-party exchanges respectively.

212. As I explained in my Opening Report, Google has the ability to vary its fee structure across markets but imposes the largest fee on AdX. Google itself acknowledges that its AdX take rate was unresponsive to competition. Internal documents show the following:

213. Google Director, and later Managing Director, [REDACTED], indicated that Google was not seeing pressure on the AdX [REDACTED] take rate and attributed this insulation from competition to the nearly exclusive access AdX has to GDN demand.^{345, 346} Across different internal communications, Google also acknowledges that its high and stable take rate was the result of its monopoly power.^{347,348} Google acknowledges that its pre-discount pricing is not competitive^{349,350} and industry participants also state that Google does not face pressure from competition.^{351,352} The direct evidence, contrary to Professor Baye, is that Google sets above competitive rates that are harmful to competition.

3. Professor Baye's claim that quality has increased due to the existence of competition

214. Professor Baye claims that Google has increased quality, but he ignores evidence to the contrary. I understand that other experts will address quality issues in the case. Publishers have regularly complained

³⁴⁵ GOOG-NE-11809454 at -454. "SellSide Guiding... - Just how much pressure we are under?" (August 6, 2018). Internal Google comments on SellSide Guiding Principles document. ("We are NOT seeing pressure on the AdX [REDACTED] but I am making a statement that it is because it provides nearly exclusive access to GDN demand. If GDN bought liberally through all 3Pes, I think the [REDACTED] would crater. What I am suggesting is that 'comparing two bids and running an auction' is proven to not be worth [REDACTED]")

³⁴⁶ GOOG-TEX-00679746 at -746. "Re: PRIVILEGED AND CONFIDENTIAL" (June 25, 2018). Internal email thread between [REDACTED]. ("The AdX sell-side fee of [REDACTED] holds today not because there is [REDACTED] of value in comparing 2 bids to one another, but because it comes with unique demand via AdWords that is not available any other way. [...] but I think we are all in agreement that 'exchange functionality' is not worth [REDACTED] and values come from sourcing demand.")

³⁴⁷ GOOG-NE-05271214 at -222. "Re: Rubicon margins" (November 4, 2017). Internal Google email responding to ad exchanges cutting fees. ("While true that [REDACTED] for just sellside platform/exchange isn't likely justified by value, I equally don't think Rubicon or AN can run an actual business with [REDACTED] or even [REDACTED]")

³⁴⁸ GOOG-TEX-00106259 at -260. "Re: Rubicon margins" (November 4, 2017). Internal Google email responding to ad exchanges cutting fees. ("The pipes that deliver that demand should charge a 'utility fee.' Let's call it [REDACTED] We can debate whether it should be [REDACTED] or [REDACTED] but it doesn't change the overall approach. [...] Our take rate plunges from around [REDACTED] to [REDACTED]")

³⁴⁹ GOOG-NE-04423109 at -123. "Pricing - Track 1 Discussion" (April 4, 2017). Internal deck on pricing strategy. ("Advanced discounts, to be used only when in a competitive situation with a proven [REDACTED] offer.")

³⁵⁰ GOOG-TEX-00120929 at -930. "Jedi++ Header Bidding Response Options" (October 13, 2016). Internal documentation on strategy concerning Header Bidding. ("Compete more aggressively with other exchange [...] Lower AdX revshare to 9 - 14%")

³⁵¹ [REDACTED]

³⁵² I note that Professor Baye's claim that Google only retains about 31% of advertisers' dollars while rival providers keep around [REDACTED] in total is not supported by convincing evidence (Baye Report, ¶383). Professor Baye relies on a Google blog post which states "some have estimated that as much as half of the revenue from display advertising is kept by the advertising technology providers themselves. We can't speak for the many other companies in this space, but that is not the case for Google.", without any further proof.

about the quality of AdX.³⁵³ Reports by Confiant, an analytics company assessing the quality of ads, show that AdX has a much higher rate of bad ads than other exchanges. For instance, Google, despite its resources, performed poorly compared to other smaller players. Confiant shows that in 2021: “Google remained an outlier in terms of both security violation rate and type, with Q4 exceeding their overall 2021 violation rate.”³⁵⁴

215. The only evidence Professor Baye presents to support the fact that Google has increased the quality of ad tech products, is a single internal Google presentation,³⁵⁵ which he claims shows that publishers value and choose Google’s DFP for its quality. However, the evidence does not support this statement. The slide Professor Baye references shows that, on factors such as reporting, Microsoft dominates over both XFP and DFP.³⁵⁶ The conclusions are thus ambiguous. The presentation also relies upon data collected in 2007 and 2008, immediately following Google’s acquisition of DoubleClick. Thus, the results of this survey realistically cannot yet speak to Google’s claimed improvements in ad serving quality. Another comparison of head customer satisfaction between the years of 2007 and 2008 shows that none of the features of Google’s DFP/ XFP were perceived as improving in the period immediately following the acquisition. Most perceptions of head customers remained unchanged during the years following the acquisition, while the performance perception on “Rich media Formats” and “Rich Media Capabilities” decreased.³⁵⁷

216. Similarly, Google implemented changes that decreased the quality of its tools. As I discussed in my Opening Report, conduct such as the tie, UPR, line item caps, data redaction, and Bernanke negatively impacted the quality of Google’s ad tech tools for publishers and/or advertisers. For instance, I showed how Bernanke enabled lower-quality ads to be transacted and displayed on publishers’ properties. I provided the example of *The New York Times* experiencing clickbait ads promoting fake news as a result of Bernanke overriding floors.³⁵⁸ Professor Baye addresses none of this.

³⁵³ See, e.g., GOOG-AT-MDL-019760486 at -489. “Re: Urgent PR/Legal Escalation about Bad Ad” (Sep. 7, 2018). Internal email chain between [REDACTED]

[REDACTED], “NewsCorp, MCN, Fairfax ACM, Stuff have all raised bad ads today. ... [W]e’re looking at a total revenue risk of [REDACTED] from just these publishers and a serious dent to our credibility.”

³⁵⁴ GOOG-AT-MDL-013281506 at -508. “Publisher Per Buyer SafeFrame Control” (May 2, 2022). Internal document on tools used by publishers to control for the quality of ads displayed.

³⁵⁵ Baye Report, footnote 385.

³⁵⁶ GOOG-TEX-00441752 at -783. “XFP Pricing Implementation” (Undated). Internal Google presentation on the impact of the DFP fee change. A slide called “Head Customers: Value Assessment, XFP at launch” looks at XFP, Microsoft, Yahoo, AdTECH, OpenX, WPP (24/7), DFP, and Zedo.

³⁵⁷ GOOG-TEX-00441752 at -783. “XFP Pricing Implementation” (Undated). Internal Google presentation on the impact of the DFP fee change. A slide called “Head Customers: more on what they value” shows a map of different features and how DoubleClick’s DFP solution is performing on those features in 2008 vs. 2007. Most of the features are in the “on par” bucket.

³⁵⁸ Gans Opening Report, ¶¶760, 761. (“Google internally acknowledged the quality issues that Bernanke generated. A notable escalation of this issue concerns *The New York Times*. [...] *The New York Times*’ escalation illustrates the lack of control that one of the largest publishers faces due to Google’s secretive and misleading auction manipulation. Bernanke blurs Google’s auction logic for publishers, limiting publisher decision-making power and diminishing their control of ad quality on their websites.”)

217. Industry publications have expressed these concerns regarding Google's introduction of optimized pricing highlighting that Google's bid prices have been excessively shaded, resulting in less competitive offers.³⁵⁹ On the advertiser side, it has become increasingly challenging to assess the effectiveness of ad campaigns, posing significant quality issues for agency analytics teams.³⁶⁰

218. As a result, publishers often ranked Google products lower than competitors in the Waterfall hierarchy.³⁶¹ A 2014 document states: "today yield optimization happens through impressions being passed to one exchange / buyer with a certain minimum CPM (floor), and if they can't meet the floor, it gets sent to a "100% fill exchange" – most often AdSense/AdX. Currently 20+% of the impressions on AdX and AdSense are 'Passbacks' from other exchanges [...]."³⁶²

219. Finally, I note that the conduct that I have examined in this case often involved choices made by Google that directly reduced value to its customers (that is, advertisers and/or publishers as the case might be). Firms facing significant competition are severely punished for quality reductions. Here, the evidence shows Google is insulated from competition. The fact that Google can maintain stable margins, and prices, and reduce quality all demonstrates that Google has monopoly power.

B. Google experts do not provide reliable analyses of indirect evidence of market power across the relevant markets

220. In addition to the direct evidence discussed in the previous section, in my Opening Report, I analyzed Google's market power in the relevant markets, relying on empirical evidence from market shares and barriers to entry.³⁶³

³⁵⁹ AdExchanger. "What Publishers Need to Know About Google's Optimized Pricing," (June 8, 2022). Accessed September 5, 2024. <https://www.adexchanger.com/the-sell-side/what-publishers-need-to-know-about-googles-optimized-pricing/> ("Google's bid prices have been shaded too much and appeared less competitive.")

³⁶⁰ AdExchanger. "Did Google Just Kill Independent Attribution?," (May 7, 2018). Accessed September 5, 2024. <https://www.adexchanger.com/analytics/did-google-just-kill-independent-attribution/> ("Without these IDs, exported DCM log files can't be used to determine true reach and frequency or to build MTA models, which are by definition user-level. MTA is not the only way to measure the true impact of ads but is theoretically the most accurate and provides by far the most detailed results. [...] Also affected are agency analytics teams and MTA consultants. Without log files to analyze, they're reduced to the less lucrative role of report jockeys.")

³⁶¹ The Waterfall designated the process for selling publishers' space, in which potential advertisers, or demand sources, are called sequentially, one at a time, to submit bids. See Gans Opening Report, ¶95.

³⁶² GOOG-DOJ-14875108 at -110. "Inventory access – Strategy Summit 2-pager" (August 15, 2014). Internal Google strategy document on yield optimization on display. The document states that Google has "a very strong position as a '100% fill exchange.'"

³⁶³ Gans Opening Report, section V.

221. Market share, along with barriers to entry, is an accepted method of demonstrating monopoly power. I understand that this is absolutely an accepted method in antitrust case.³⁶⁴ Most economists also agree that a firm with a high market share in a relevant market with barriers to entry can exercise market power. Economists regularly calculate market shares to aid courts in assessing market power.³⁶⁵

222. Professor Baye, however, takes the outlandish position that a firm with 100% market share may not have market power.³⁶⁶ For the reasons stated above, Professor Baye's opinion is out of step with mainstream economics.³⁶⁷

223. Professor Baye also claims that my calculations of market shares are based on "flawed methodology" for not incorporating third-party exchanges.³⁶⁸ But Professor Baye's corrections are contaminated by double-counting of third-party ad exchanges and ad buying tools' transactions already accounted for in my approach. Professor Baye not only misrepresents calculations made clear in my Opening Report,³⁶⁹ but his proposed market shares contradict basic case facts he does not dispute – i.e., DFP's substantial market share during the period analyzed. Professor Baye's egregious data analysis errors with respect to market shares are discussed in detail in Appendix C.

224. Google's Experts also do not address the barriers to entry explained in my Opening Report. Professor Baye's assessment is limited to the assertion that these barriers are "purported structural characteristics of the ad tech industry."³⁷⁰

³⁶⁴ For example, *United States v. Microsoft*, 253 F.3d 34, 51 (D.C. Cir. 2001) ("Considering the possibility of new rivals, the court focused not only on Microsoft's present market share, but also on the structural barrier that protects the company's future position. Conclusions of Law, at 36. That barrier--the "applications barrier to entry"--stems from two characteristics of the software market: (1) most consumers prefer operating systems for which a large number of applications have already been written; and (2) most developers prefer to write for operating systems that already have a substantial consumer base.")

³⁶⁵ It is well established in the economics literature and among antitrust practitioners that evaluating market shares and barriers to entry are standard approaches to evaluating market power. In the 2023 Merger Guidelines, the DOJ and FTC state that Agencies "first assess" whether a firm has a dominant position "based on direct evidence or market shares showing durable market power. See Blair, Roger and David Kaserman, *Antitrust Economics*, Oxford (2009): at 107-109. ("we find that a positive relationship exists between market share and market power.")

³⁶⁶ Baye Report, ¶283. ("A high market share alone is not sufficient to infer monopoly power. It is well-known in economics that even firms with 50 percent or even 100 percent market shares may have no market power whatsoever.")

³⁶⁷ Professor Baye states that "it well-known in economics that even firms with 50 percent or even 100 percent market shares may have no market power whatsoever." (Baye Report, ¶283). In doing so he refers to perfectly contestable markets, which is widely viewed as implausible in the economic literature. As shown by Schwartz and Reynolds perfect contestability requires two implausible conditions (1) an entrant can enter instantaneously at any scale and (2) an entrant can undercut an incumbent's price and exit with no loss of fixed costs before the incumbent can adjust price. These conditions are implausible for any market and do not apply in the context of the Display Advertising Markets I have delineated in which entry requires substantial engineering costs and investments. Moreover, these conditions would not characterize Professor Baye's transactions platform market either. See Schwartz, Marius, and Robert J. Reynolds. "Contestable markets: An uprising in the theory of industry structure: Comment." *The American Economic Review* 73.3 (1983): 488-490.

³⁶⁸ Baye Report, ¶279.

³⁶⁹ Baye Report, Appendix VI, ¶3; See also, Baye Report, Appendix VI, ¶8.

³⁷⁰ Baye Report, ¶56.

1. Professor Baye's market share opinions

a) Publisher ad servers

225. In my Opening Report, I estimated DFP's market share over the years using Google documents that provided the closest proxies to the relevant market.³⁷¹ I found that Google consistently grew its share of the ad serving market since its acquisition of DoubleClick and, in 2019, Google had over [REDACTED] market share of addressable domains in the market for ad servers used for open web display advertising.³⁷² None of Professor Baye's opinions discussed below affect my original conclusions regarding DFP's monopoly power.

226. As I explained in my Opening Report, Google has an explicit mandate for its employees not to report market shares. I used the following metrics: share of impressions, share of overall advertising spend, and share of publishers or addressable domains using DFP.³⁷³ These are standard metrics of market share capturing DFP's dominance across the relevant customer base (publishers running ads) – especially given that publishers rarely use more than one ad server – and DFP's coverage of display impressions served on the open web unmatched by competitors.³⁷⁴ These are standard and relevant metrics of market share because they are informative about Google and rivals' competitiveness.³⁷⁵ As I explain below, none of Professor Baye's responses has caused me to change my opinion.

227. Professor Baye, however, considers that the documents I rely on to estimate Google's market share in the ad server market are unreliable. Professor Baye provides two main reasons for his conclusion: (i) he

³⁷¹ Gans Opening Report, Section V.C.1.

³⁷² Gans Opening Report, ¶353. ("No matter how market shares are measured, Google's ad server consistently has monopoly power in the relevant market across the years. DFP accounted for [REDACTED] of indirect ad spend from North American publisher websites ("domains") in 2010 and [REDACTED] in 2011. In 2012, Google reported it had a market share in terms of penetration amongst publishers in the U.S. at [REDACTED]. Consistently with that rate of growth in penetration over time, in 2015, Google internal communications affirmed that Google's ad server was chosen by [REDACTED] of publishers. An internal document from Facebook shows that DFP served

[REDACTED] of web impressions in 2017, and they expected it to be [REDACTED] in 2022. For the years 2018 and 2019, DFP had a [REDACTED] market share in terms of the number of addressable domains. This shows clearly that Google had a consistently high share in the market for publisher ad servers used for the sale of open web display advertising.")

³⁷³ Gans Opening Report, ¶350, see also Figure 9. ("From 2008 through 2019, Google internally reported market share in the market for publisher ad servers based on the share of impressions, share of overall advertising spend, and share of publishers or addressable domains using DFP (Figure 9).")

³⁷⁴ U. S. Department of Justice and Federal Trade Commission, *Horizontal Merger Guidelines*, December 2023. ("How market shares are calculated may further depend on the characteristics of a particular market, and on the availability of data. Moreover, multiple metrics may be informative in any particular case. For example: [...] Unit sales may provide a useful measure of competitive significance in cases where one unit of a low-priced product can serve as a close substitute for one unit of a higher-priced product. For example, a new, much less expensive product may have great competitive significance if it substantially erodes the revenues earned by older, higher-priced products, even if it earns relatively low revenues. [...] Non-price indicators, such as number of users or frequency of use, may be useful indicators in markets where price forms a relatively small or no part of the exchange of value.")

³⁷⁵ U. S. Department of Justice and Federal Trade Commission, *Horizontal Merger Guidelines*, December 2023. ("The Agencies measure each firm's market share using metrics that are informative about the market realities of competition in the particular market and firm's future competitive significance.")

rejects standard measures of market share (i.e., share of customers and share of volume transacted); (ii) he claims that the shares I present do not correspond to the market I defined.³⁷⁶ Professor Baye provides no basis for his opinion that the metrics I use in my report do not represent market shares, and neither of these claims have merit.

228. Professor Baye's second criticism is that the metrics I presented do not perfectly align with my market definition. He finds that the market shares I presented are over-inclusive. For example, Professor Baye states that the share in the Google document I use to support that DFP has a share of [REDACTED] for 2018 and 2019 "include in the numerator competitive alternatives to Google's ad server as well as publishers forgoing an ad server to connect directly with a demand source."³⁷⁷ First, Professor Baye misapplies how the market share calculation works. The numerator of DFP's market share based on GFP tags owned by Google cannot include and, therefore, cannot be inflated by the number of competitor tags like the one he cites.³⁷⁸ Professor Baye does not acknowledge that ad tags are part of the functioning of ad servers. The presence of an ad server's ad tag on a website demonstrates that the publisher uses that ad server.³⁷⁹ For this reason, before mandating that employees stop calculating market shares,³⁸⁰ Google routinely measured its ad server market share using the presence of ad tags.³⁸¹ Importantly, measuring ad server market shares through the presence of ad tags underestimates DFP's market share because, in earlier periods, ad tags were frequently utilized by ad networks to directly connect to publishers even though these networks did not offer ad serving capabilities.³⁸² Professor Baye acknowledges the existence of these direct

³⁷⁶ Baye Report, ¶329.

³⁷⁷ Baye Report, ¶330.

³⁷⁸ Baye Report, footnote 477.

³⁷⁹ Gans Opening Report, ¶426. ("An ad tag is a piece of code that publishers put on their website in order to sell ads. A publisher generates an ad tag using a publisher ad server and inserts the ad tag into their website's html code. When a user visits a publisher's website, the code for the ad tag runs and sends a signal for an ad request to the publisher's ad server. Based on the information provided by the ad tag, the publisher ad server runs its decisioning logic and identifies a winning ad to serve in the ad slot. The winning demand source sends the ad, via a reference URL, to the publisher's ad server. The publisher ad server then serves the ad creative to the user visiting the web page by loading the finalized ad tag on the web page.")

³⁸⁰ See Gans Opening Report, ¶351. ("I could not identify documents tracking Google's market share in the publisher ad server market after 2019 in Google's production consistently with Google policy since at least two years. See Deposition of [REDACTED] (Managing Director for Global Publisher Platforms, Google), 259:16-259:25, May 1, 2024. ("(Counsel): What else did you discuss with respect to the tracking of sell-side market shares? [REDACTED]) So we asked Susan a few questions in terms of her knowledge whether or not she knew before my time as to whether or not there were consistent tracking of sell-side market-shares. Susan confirmed that there was no consistent tracking of sell-side market shares that she knew of as well."); See also, Deposition of Darline Jean (Managing Director for Global Publisher Platforms, Google), 111:23-112:12, May 1, 2024. ("(Counsel): How long has that been the case that Google employees have been instructed not to conduct market share calculations? [REDACTED]): It has been the case definitely since I joined the past two years. Before that, that's also, from my understanding, with my peers, that was also the understanding that market share cannot be part of our operations. (Counsel): When was the first time that you received that instruction? [REDACTED]): The first time I received it was when I joined. As part of the GPL organization when I joined, it was very clear we cannot do market share analysis; and I was running the strategic team at that point in time.")

³⁸¹ GOOG-NE-02327581 at -606. "Winning against AppNexus" (October 26, 2016). Google presentation comparing AppNexus to DFP and DRX shares of footprint by DFP tags and AdX Direct tags.

³⁸² Gans Opening Report, ¶580. ("AdMeld's Commercial Director explained: "When a publisher makes an impression available on our platform, AdMeld issues a bid request, and each bidder must respond within [REDACTED] milliseconds. These bids compete not

connections but does not expose the critical logical conclusion that this inclusion makes the metric at issue a conservative estimate of DFP's market share in the relevant market. Instead, Professor Baye focuses on the fact that two other types of Google tags increase the numerator of Google's own market share calculation – Yavin tags and Google's AdSense tags – and misstates the effect of network tags.³⁸³

229. Professor Baye also questions the relevance of market shares I present for customer segments that Google defines (such as “DFP Premium”), corresponding to large publishers,³⁸⁴ and that Professor Baye's analysis shows corresponds to almost the entirety of DFP impressions.³⁸⁵ Professor Baye claims that this customer base market share estimate, which, from his own analysis, captures nearly all impression volume, is not reliable. Analyzing DFP billing data, I find that between 2014 and 2022, DFP Premium publishers accounted for █████% of ad units served and █████% of DFP revenue.³⁸⁶ For this reason, this customer segment is highly probative of DFP's overall market share.

230. In sum, none of Professor Baye's attempts to undermine the estimates I present of Google's market share in the publisher ad server market are relevant. The shares I presented in my Opening Report using various metrics and the closest available approximations of the relevant market establish consistent and conservative indicia of DFP's monopoly power. Importantly, Professor Baye reaches no conclusion about his red herring claim related to the estimates I use for Google's market power in the publisher ad server market. Professor Baye does not offer an analysis of Google's market share in any relevant market. Notably, Professor Baye does not address how it is possible that Google estimated such large market shares for itself in the publisher ad server market (with minor differences in transaction types and other Google products included or excluded across measurement approaches) and, yet (i) such market does not exist and (ii) Google's market share in the market I define could be substantially different.

231. Moreover, my analysis of the data submitted by third-party ad servers in the case also yields a market share above █████% for DFP from 2019 until today. Figure 9 below shows that, even when taking a

only with one another, but also against other available demand sources (such as ad network tags). Among valid bids that meet the price, advertiser and other criteria of the publisher's business rules, AdMeld picks the winner and redirects to the creative.” As a result of its optimization function, AdMeld would move the decision logic away from Google – a threat to the “own-the-tag” strategy. See GOOG-NE- 02111579 at -579. “Re: sale reductions.” (March 23, 2009). Internal email thread. (“If we lose platform share, we can build the best GCN in the world but will still be at a severe risk of being disintermediated if Y, M own the ad tag on the publisher page.”)”)

³⁸³ Professor Baye also casts doubt over Google's ability to measure its own market share, stating that “The denominator of the share he uses is simply the number of web domains considered (█████) and the document does not indicate whether these domains were selected randomly or for some other reason.” See Baye Report, ¶330. Professor Baye omits that, in the preceding slide of Google document I rely on, Google uses the term “DFP market share.” See GOOG-NE-13279022 at -027. “DFP Fees on Google-monetized impressions” (June 4, 2012). Internal Google Presentation to get approval on DFP fee changes.

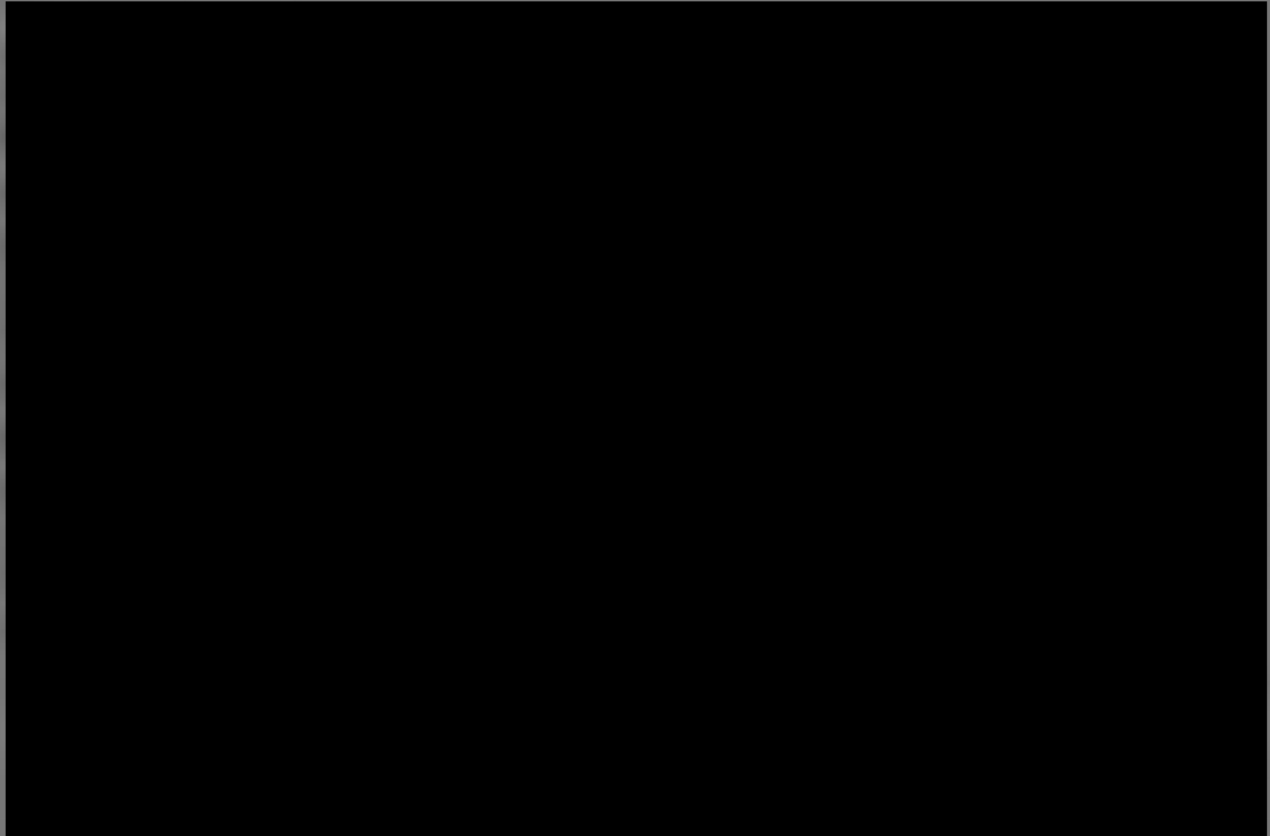
³⁸⁴ Baye Report, ¶333, ¶335.

³⁸⁵ Baye Report, ¶243.

³⁸⁶ Source: DOJ RFP 57 DFP Fees. DFP Premium publishers accounted for █████ billed units and Small Business publishers accounted for █████ billed units between 2014 and 2022.

more inclusive approach to competitors' transactions than Google's and adding FreeWheel's impressions that are largely instream video inventory (outside of the market definition), DFP is overwhelmingly larger than competitors. Restricting FreeWheel's served inventory to non-video takes DFP's market share to nearly █% throughout the same period.

Figure 9



232. Further, deposition testimony in this case confirms that Google has a very high market share in ad servers. █ 388 █

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b) Ad exchanges

233. In my Opening Report, I presented a conservative calculation of AdX's market share between 2018 and 2021 based on all DFP indirect transactions and empirical evidence on AdX's share of impressions transacted outside of DFP.³⁹¹ I found that AdX had a market share of approximately █% in 2018 and is growing each year. In 2021, the last year for which data was available, I estimated AdX's market share of all indirect open web display impressions transacted to be approximately █%.³⁹² The calculations for AdX's market share I present in my Opening Report are not affected by Professor Baye's opinion. In fact, when applying the correct methodology to the third-party ad exchange dataset Professor Baye assembled, I confirm that my original estimates were conservative.

234. In spite of the clear documentation of my methodology and the data used, Professor Baye misconstrues the set of transactions I use in my calculations. Professor Baye repeatedly states his mistaken understanding of the set transactions used in my calculations. He incorrectly applies a method that assumes that: (i) I did not account for impressions served by non-Google ad servers and that (ii) the set DFP transactions I use are limited to what DFP identifies as Header Bidding and Open Bidding.³⁹³ Neither assumption is correct, and both issues are made clear in my report.³⁹⁴ In addition to applying adjustments departing from these incorrect assumptions, Professor Baye builds adjustment factors that suffer from serious measurement problems widely reported in Google internal documents and data documentation.³⁹⁵

235. In Appendix C, I explain in detail how Professor Baye's attempt to adjust my calculations is flawed. Here, I focus on the conclusions Professor Baye would have reached had he done a proper market share calculation with the dataset he compiled of third-party exchange transactions based on productions by these exchanges.³⁹⁶

236. If Professor Baye had compared the volume of AdX impressions by year to the total volume of third-party exchanges' impressions data he compiled, two measures he calculated when constructing his two data panels,³⁹⁷ he would have arrived at completely different conclusions. Figure 10 below compares the volume of impressions transacted by AdX versus the next largest third-party exchanges between April 2019 and May 2020 using the panel constructed by Professor Baye.

³⁹¹ Gans Opening Report, Table 5. *See* Gans Opening Report, footnote 428 for transaction types included in the calculation.

³⁹² Gans Opening Report, Table 5.

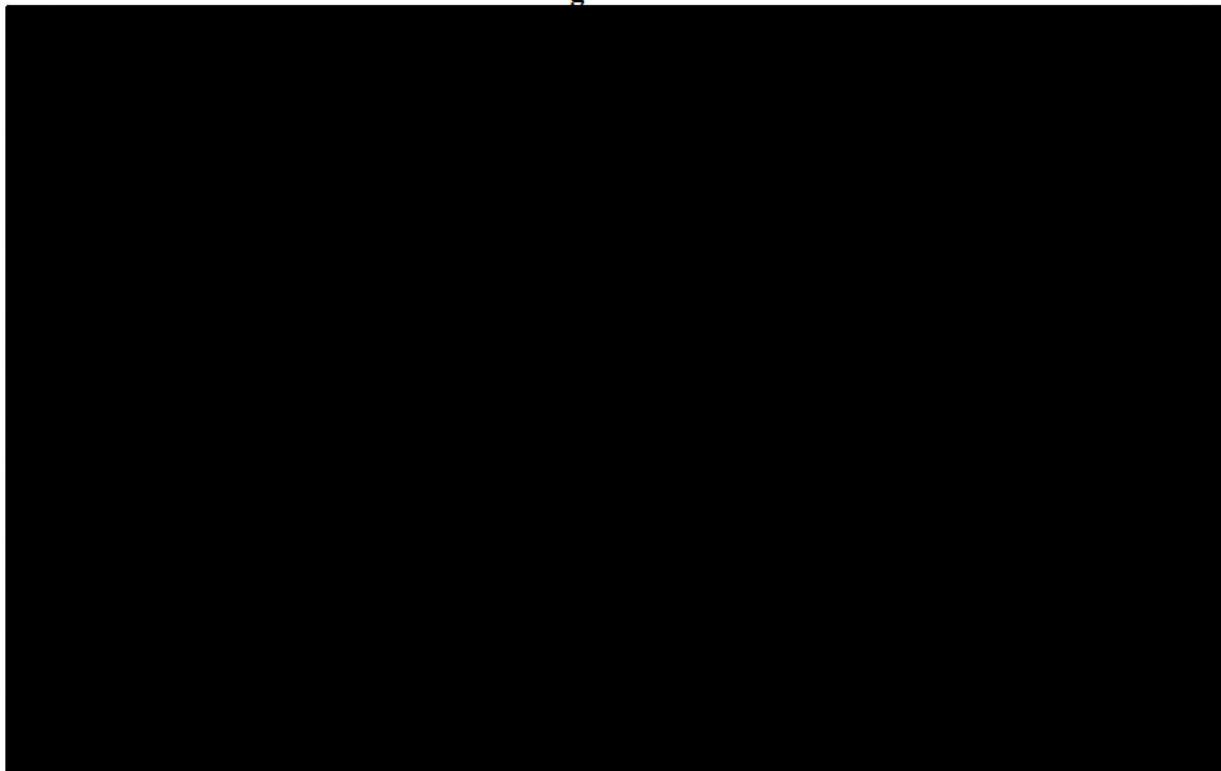
³⁹³ Baye Report, ¶322. Table 9 in Appendix C shows how Professor Baye incorrectly labels the transactions used in my calculations as "Header Bidding and Open Bidding" when the set of transactions is broader.

³⁹⁴ *See* Gans Opening Report. Footnote 430 deals with non-DFP impressions. Footnote 428 explains that all indirect impressions are included in the calculation, including but not limited to Header Bidding and Open Bidding transactions.

³⁹⁵ *See* Appendix C.

³⁹⁶ *See* Appendix C for third-party data details.

³⁹⁷ *See* Appendix C for details on the datasets compiled by Professor Baye.

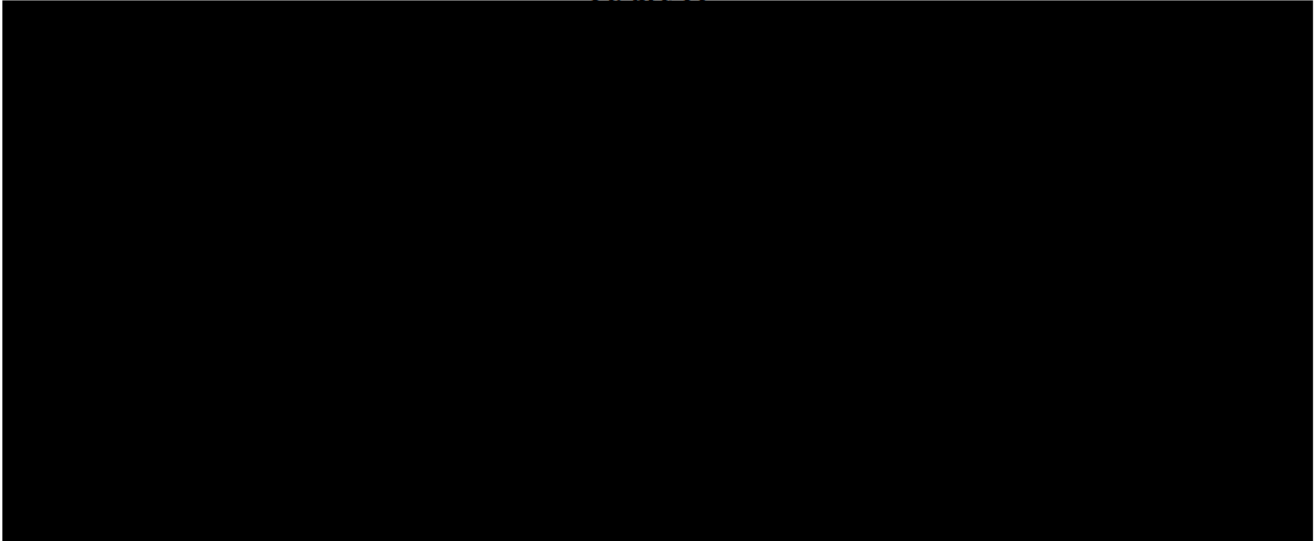
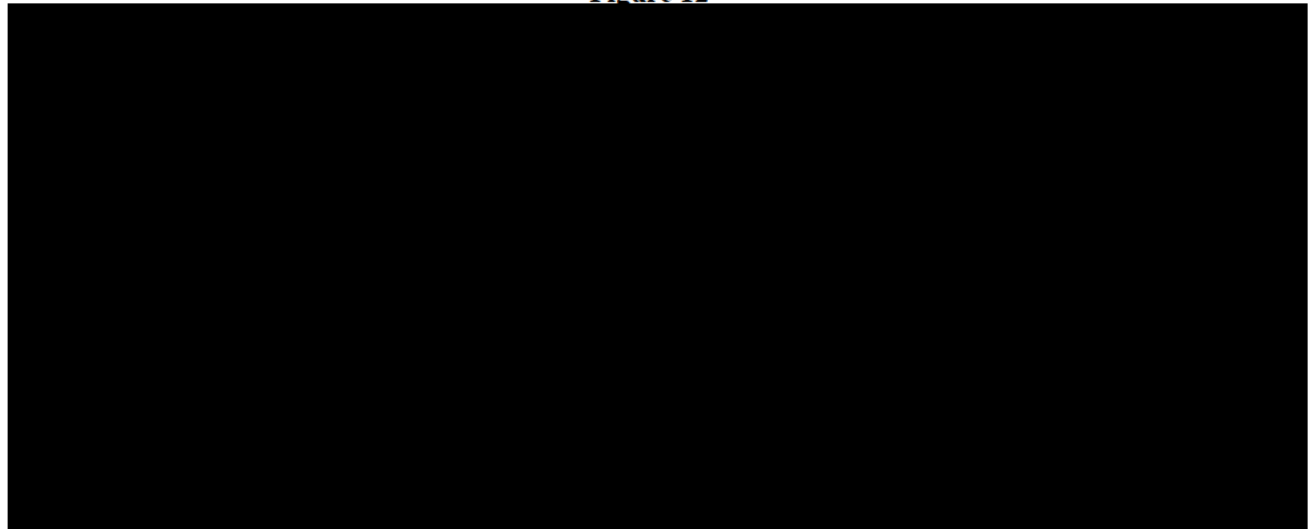
Figure 10

237. Indeed, when comparing AdX impressions to third-party exchanges' impressions the data from third-party exchanges in Professor Baye's dataset, I find that AdX held a market share above █% of impressions since January 2020 in the U.S., even without correcting for a mistake in Professor Baye's data assembly. I present this market share in Figure 11. In Figure 12, I present the same chart but correcting for Professor Baye's data assembly mistake – i.e., removing Yahoo because Professor Baye erroneously included worldwide Yahoo transactions in his U.S. market share estimates and the Yahoo data █

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³⁹⁸ Source: AdX impressions are identified by limiting MDL RFP 243 AdX Submission Data to rows where the transaction_type_name is "OA – Open Auction." For all other 3rd party ad exchanges, the data are replicated according to the filters listed in Appendix VII section C of the Baye Report. Additional filters have also been applied to limit to impressions from the United States where applicable. Yahoo is excluded because it is no longer part of the relevant market following its closure of Yahoo SSP and produced data does not allow filtering to U.S. impressions. The period of this graph is chosen based on data being available for all exchanges shown above.

³⁹⁹ I also estimate the market share of ad exchanges who did not produce data. I calculate the share of impressions from exchanges who did not produce data relative to exchanges who produced data using data from a non-Google ad buying too (Criteo). I find that exchanges who did not produce data account for a small share of impressions and having accounted for their transactions would not change my conclusions regarding AdX's market share.

Figure 11**Figure 12**

238. These figures also make clear the ad exchange market fragmentation I discuss in my Opening Report.⁴⁰⁰ Deposition testimony further confirms the fragmentation of the ad exchange market. [REDACTED]

⁴⁰⁰ Gans Opening Report, ¶376. (“AdX is almost [REDACTED] times as large as the next closest rival, [REDACTED]. In 2018, Google’s exchange transacted at least \$ [REDACTED] in gross revenue. Rival exchanges like Xandr transacted less than \$ [REDACTED], Rubicon and Index Exchange each transacted less than \$ [REDACTED], OpenX and PubMatic transacted close to \$ [REDACTED] each. This difference reflects the fragmentation of the non-Google share of the market.”)

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c) Ad buying tools for small advertisers

242. In my Opening Report, I provide conservative estimates for Google Ads' market share using a standard two-step approach based on Google's produced DFP and AdX data. I found that, in a conservative estimation scenario, Google Ads had market share of approximately █% in 2021.⁴⁰⁶ First, I estimate Google Ads' share of AdX impressions among ad buying tools for small advertisers. Second, I make the conservative assumption that Google Ads represents 0% of transactions from third-party exchanges in the relevant market. Departing from this conservative assumption, I multiply Google Ads' share of AdX impressions by AdX's market share to arrive at Google Ads' market share in the relevant market. Using data available now from third-party ad buying tools assembled by Professor Baye, I find that my original estimates were very conservative.

243. Professor Baye misunderstands my methodology for calculating Google Ads' market share. He assumes that I did not account for volumes transacted by ad buying tools for small advertisers outside of AdX.⁴⁰⁷ This is incorrect. I explain in my report how I account for the transactions occurring outside of AdX in a way that makes my estimates for Google Ads' market share conservative.^{408,409}

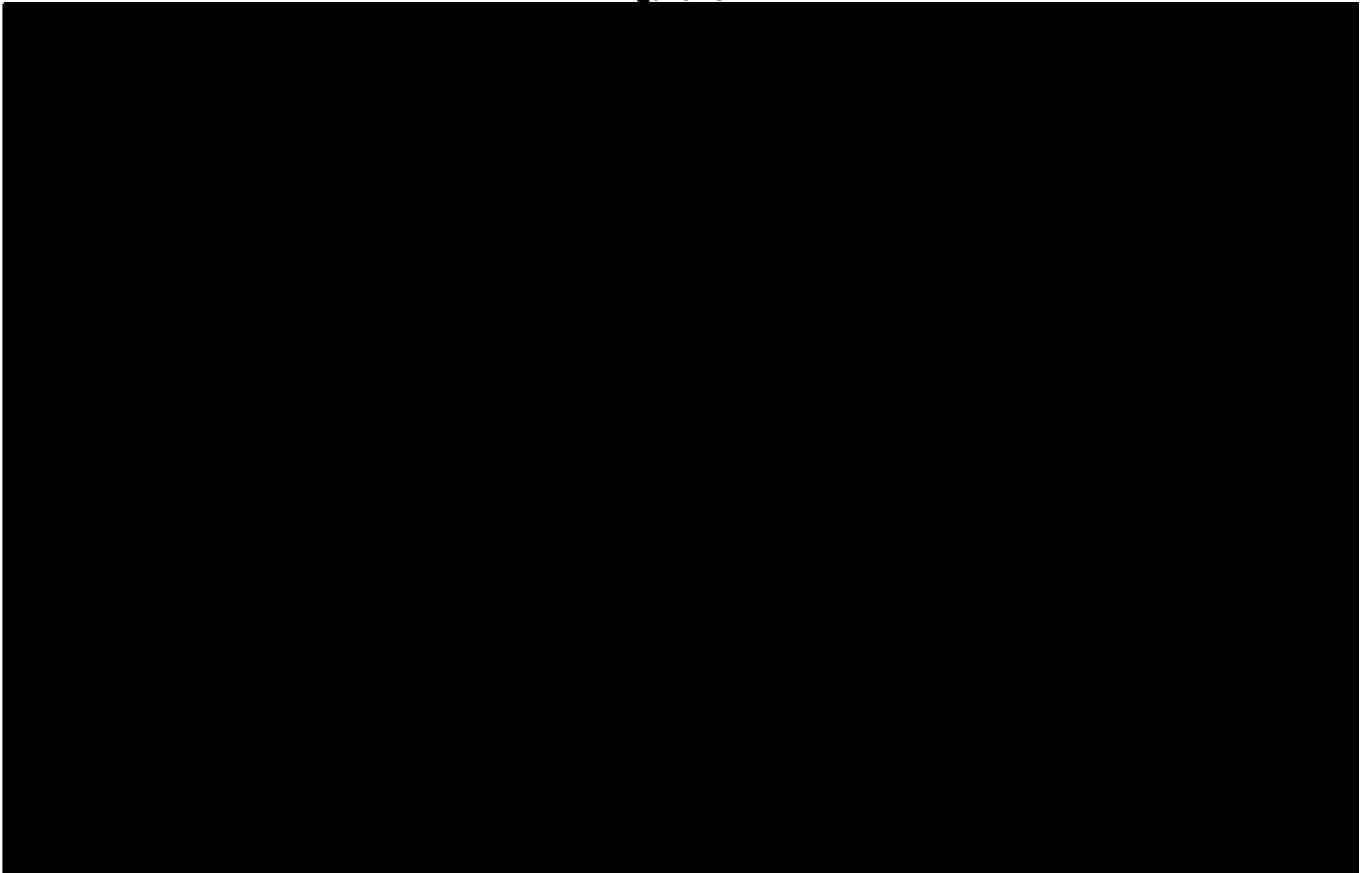
244. Further, the same third-party data Professor Baye used to double-count third-party ad buying tools in his adjustments to my calculations, when simply used to directly calculate the market share of impressions, reveals that Google Ads holds █% of impressions in 2019 when data is available for all competitors in the relevant market.

⁴⁰⁶ Gans Opening Report, Table 7.

⁴⁰⁷ Baye Report, ¶327.

⁴⁰⁸ Gans Opening Report, ¶394 and Table 7 showing the multiplication of Google Ads' share of AdX transactions is multiplied by AdX's market share to arrive at Google Ads' market share.

⁴⁰⁹ Professor Baye's report also misquotes my report. Baye Report, footnote 471.

Figure 13

245. Deposition testimony also supports my market share calculation and accurately describes the dominance of Google Ads within the ad buying tool market for small advertisers.⁴¹¹

246. [REDACTED]
[REDACTED].⁴¹² The scale of exclusive inventory set up

⁴¹⁰ Sources: Google XP data. *See* Appendix C for third party data documentation. *See* Gans Opening Report, Table 7 for conclusions regarding Google Ads' share of impressions in AdX. My calculations show that including competitors who did not produce data would not change my conclusions from Figure 13 since all of Google Ads' competitors combined account for less than █% of AdX (the largest ad exchange) impressions. The period of this graph (January to June 2019) is chosen based on the data available for all ad-buying tools shown above.

⁴¹¹ [REDACTED]

⁴¹² [REDACTED]

insurmountable barriers for innovative competitors to enter the market⁴¹³ and makes Google Ads an indispensable tool for small advertisers.⁴¹⁴

d) Market shares in Professor Baye's alleged transactions platform market

247. Professor Baye puts forth a candidate market he calls a "multi-sided transaction platform market for matched display ad impressions" and, throughout his report, defends that Google is a "multi-sided platform" "integrated across components of the ad tech stack."⁴¹⁵ As such, Professor Baye defends that there is a single market for firms that are transaction platforms operating all components of the ad tech stack.

248. Professor Baye's analysis of Google's lack of market power in this market relies solely on the indirect evidence of market shares he calculates. His analysis of Google's market share in his candidate market also does not follow standard methodology and has important inconsistencies.

249. First, when calculating market shares for his candidate market, Professor Baye does not follow a standard methodology.⁴¹⁶ Professor Baye instead considers that Google competes against any firm with "display advertising revenues,"⁴¹⁷ regardless of whether they operate an integrated ad tech stack or not, using eMarketer data. Following this novel approach, he concludes that the best measure of Google's market share is to calculate its share of spending on all display ad transactions.⁴¹⁸ In the denominator of his market shares, he includes all display ad spend associated with companies like Meta, Amazon, Microsoft, Twitter, Comcast NBCUniversal, TikTok and a "host of display ad competitors."⁴¹⁹

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⁴¹⁵ Baye Report, ¶70.)

⁴¹⁶ Professor Baye defines a transaction platform market. Standard methodology prescribes that transaction platforms only compete with other transaction platforms. *See* Tim Wu, "The American Express Opinion, Tech Platforms & the Rule of Reason", *The Journal of Antitrust Enforcement*, Forthcoming (2018). Pg. 2. ("As such, according to the Court, transaction platforms only compete with other transaction platforms.")

⁴¹⁷ The denominator in Professor Baye's calculation is contains any company that has "display ad spend" according to eMarketer.

⁴¹⁸ Baye Report, ¶70. ("Because Google's multi-sided platform is integrated across components of the ad tech stack and also competes against other integrated platforms, as well as against platforms that do not operate all three components of the ad tech stack, the best measure of Google's market share is to calculate its share of spending on all display ad transactions.")

⁴¹⁹ Baye Report, ¶359.

250. Professor Baye never justifies his choice to use eMarketer data for market shares, let alone his choice to use this data for Google's competitors but not Google itself. Market shares must account for competitors who are relevant substitutes in a candidate market for a group of customers. eMarketer's description of their data does not suggest the data is fit for this purpose. eMarketer describes its methodology as follows: "Estimates are based on the analysis of various elements related to the ad spending market, including macro-level economic conditions, historical trends of the advertising market, historical trends of each medium in relation to other media, reported revenues from major ad publishers, estimates from other research firms, data from benchmark sources, consumer media consumption trends, consumer device usage trends, and eMarketer interviews with executives at ad agencies, brands, media publishers, and other industry leaders."⁴²⁰

251. Second, while Professor Baye's approach is very generous with what it considers as relevant revenues from competitors, it only considers *one* component of Google's ad tech stack (AdX revenues) when calculating market shares in his candidate market.⁴²¹ In Appendix C, I present what Google's market share would be in Professor Baye's candidate market if he had been consistent in the types of revenues included for Google and candidate competitors.

2. Google experts' opinions on barriers to entry

252. In my Opening Report, I analyzed the empirical evidence on the existence of barriers to entry in each of the relevant markets I defined. I found that Google's competitors face important barriers to entry in each of the relevant markets, which I recall in the subsections below.

253. Professor Baye acknowledges that there are high barriers to entry in the ad tech markets I define. He claims that "the cost structure of ad tech firms are highly skewed towards fixed rather than variable costs, as fixed investments are necessary to develop, build, test and improve technologies to efficiently match advertisers with publisher impressions."⁴²² Below, I discuss some of the barriers to entry that characterize my three relevant markets.

a) Publisher ad servers

254. In my Opening Report, I presented the overwhelming evidence from industry testimonies I used to conclude that publishers face high switching costs to change ad servers.⁴²³ Industry evidence also led me to conclude that accumulating the necessary data to effectively operate a publisher ad server also presents a

⁴²⁰ See "Methodology" column at GOOG-AT-DOJ-DATA-000066787.

⁴²¹ Baye Report, ¶356.

⁴²² Baye Report, ¶145.

⁴²³ Gans Opening Report, ¶357-362.

barrier to entry for competitors in this market.⁴²⁴ The pattern of exits and very limited entry in this market was also evidence I relied on as an indicator of barriers to entry.⁴²⁵

255. Professor Baye's report does not challenge the existence of barriers to entry related to data capabilities in the publisher ad server market. Professor Baye, however, speculates that "Google's success with data is a competitive outcome in which one firm gains business at its competitors' expense."⁴²⁶ Again, Professor Baye confuses the existence of monopoly power, in this case related to data barriers to entry, with the process through which this monopoly power was acquired.

256. Professor Baye, more generally, agrees that competitors in the ad server market face high upfront investment costs to develop an ad server and compete with an established large player such as a Google's DFP.⁴²⁷ He also understands that Google's ad server pricing strategy based on price discrimination and low fees for price-sensitive customers can deter entry under these conditions.⁴²⁸

257. In my Opening Report, I provided evidence of both lack of entry and a pattern of exists in the ad server market. My assessment is that this pattern is an indicator of barriers to entry. In alleging that I did not provide a basis to assert that it is entry barriers that prevented entry and caused exit, Professor Baye ignores additional evidence I put forth that competitors have explicitly linked this pattern to Google's market power and conduct.⁴²⁹

258. Professor Baye opines that I ignore publisher multi-homing and that multi-homing undermines Google's monopoly power.⁴³⁰ However, multi-homing is not substitution. In my Opening Report, I bring forth evidence that publishers do not multi-home and rarely switch between ad servers.

259. Professor Baye also misapplies the concept of multi-homing both generally and in relation to the ad server market. Professor Baye claims that I fail to "examine the extensive multi-homing of both advertisers and publishers with rival ad tech in his candidate markets."⁴³¹ First, Professor Baye does not

⁴²⁴ Gans Opening Report, ¶363-366.

⁴²⁵ Gans Opening Report, Table 4.

⁴²⁶ Baye Report, ¶340.

⁴²⁷ Baye Report, ¶342.

⁴²⁸ Baye Report, ¶342.

⁴²⁹ Gans Opening Report, ¶368, 369. ("Market exit also shows that entrants face substantial barriers. Industry participants have stated market exit is linked to Google's market power in the market for publisher ad servers used for the sale of open web display advertising. [REDACTED]

[REDACTED]. For instance, a 2016 article about Facebook shutting down its ad server Atlas stated: "Could Facebook put together a scaled, mature ad tech stack that would act as a check on Google's power? Turns out it couldn't."; "One academic paper summarized: "On the ad server side at the time of Google's purchase of DoubleClick, there were multiple viable alternatives (OAS, AdTech, Atlas). Ten years later only AppNexus remained, which was then bought by AT&T. These businesses have lost all or part of their revenue due to the anti-competitive conduct of Google which constitutes part of the antitrust harm.")

⁴³⁰ Baye Report, ¶303.

⁴³¹ Baye Report ¶279.

define or apply the concept of multi-homing in the manner accepted in the economics literature. Multi-homing refers to the simultaneous use of two or more products for the same purpose.⁴³² Professor Baye, however, uses the concept to refer to the simultaneous use of products fulfilling different purposes. As an analogy, a user could play video games on both their smartphone and their Xbox. They would be multi-homing between both devices. However, an increase in the price of smartphones would not mean that the user would substitute to playing on Xbox only. The increase in price would not constrain the market power of a hypothetical monopolist of Xbox.

260. In relation to the ad server market, Professor Baye confuses “rival ad tech” with ad formats and transaction types that can all be transacted by an ad server and are part of the relevant market. For this reason, the evidence of “multi-homing” between inventory types and transaction type provided by Professor Baye is irrelevant. Publishers use their single ad server to sell different types of inventories and sell their inventory via different transaction types. This does not mean that publishers are multi-homing *between* ad servers. The variety of inventory and transaction types supported by a publisher’s ad server does not undermine my market definition or Google’s market power in this market.

261. In my Opening Report, I also provide evidence of the high switching costs publishers face if they were to switch ad servers. The empirical evidence in the industry is ample.⁴³³ Professor Baye’s erroneous understanding of publisher multi-homing does not undermine this evidence or my opinion on this issue.

b) Ad exchanges

262. In my Opening Report, I relied on evidence around the market functioning and evidence whereby Google and other industry participants acknowledge the influence of network effects on the market for ad exchanges to conclude that network effects constitute a barrier to entry in this market.⁴³⁴ Further, the pattern of exits and limited entry that resulted in substantial growth in this market served as an indicator of barriers to entry.⁴³⁵

263. Professor Baye agrees with my assessment that there are network effects in the ad exchange market. In fact, Professor Baye’s opinion is that the existence of network effects should have been a greater focus in my analysis and limits his critique to the implications of this fact to competition between ad exchanges.⁴³⁶

⁴³² Athey, Susan, Fiona Scott Morton. “Platform Annexation” *Antitrust Law Journal* vol. 84, no.3 (2022). (“If those parties transact with or use more than one platform, they are said to “multi-home.” For example, a marketplace that brings together buyers and sellers of a ride-hailing service may find that both sides of the platform “multi-home,” or transact on a competing platform(s). Riders may have accounts and search for a given ride on Uber, Lyft, and Via, for example.”)

⁴³³ Gans Opening Report, ¶357-362.

⁴³⁴ Gans Opening Report, ¶377-389.

⁴³⁵ Gans Opening Report, Table 6.

⁴³⁶ Baye Report, ¶344.

264. Professor Baye points to the high number of ad exchanges' names he identifies in DFP data⁴³⁷ competing via Header Bidding and Open Bidding as evidence that, even though indirect network effects exist, high barriers to entry do not.⁴³⁸ Looking more closely at the impression volume of these exchanges across the five years of data used by Professor Baye, I disagree that this is evidence of vigorous competition from these exchanges. Professor Baye's table actually presents a picture of substantial market fragmentation.^{439,440} As demonstrated by Figure 10, AdX is more than [REDACTED] times larger than any other competing ad exchange that produced data. The drop off in exchange size is also remarkable, with only [REDACTED] exchanges transacting more than [REDACTED]% of impression volume. So, though Professor Baye might be able to find exchanges that could possibly transact ads, these exchanges hardly exert any competitive pressure on the behemoth that is AdX.

265. Professor Baye also opines that publishers' multi-homing between exchanges constrains Google's monopoly power.⁴⁴¹ However, Professor Baye's analysis suggests otherwise.⁴⁴² His data analysis shows that [REDACTED]% of publishers single-home on AdX. Out of those that multi-home, [REDACTED]% use AdX, and only [REDACTED]% of publishers multi-home, using multiple non-AdX exchanges.⁴⁴³ Publishers' multi-homing is highly fragmented across other exchanges. For example, less than [REDACTED]% of publishers multi-home on both AdX and another exchange such as Microsoft, Magnite, PubMatic, OpenX, or Index Exchange.⁴⁴⁴

266. Moreover, publishers using multiple exchanges does not mean that all exchanges are perfect substitutes. For example, if a publisher sells its inventory through OpenX and AdX but sells the majority of its impressions through AdX, substituting to OpenX might not guarantee the publisher to sell all of its inventory. Moreover, some differentiation between exchanges might limit the ability of a publisher to substitute. As I explained in section IV.A.3, AdX transacts lower quality impressions. In the tying section, I also show how publishers would be unable to substitute away from selling inventory through AdX due to

⁴³⁷ Professor Baye identifies [REDACTED] exchanges appearing in DFP data at some point throughout 2018 and 2023. *See* Figure 9 in Baye Report.

⁴³⁸ Baye Report, ¶345.

⁴³⁹ Baye Report, Figure 9. For example, Epsilon, one of the top exchanges he defines in terms of impression volume between 2018 and 2023, only transacted [REDACTED] million impressions during this period. Google's AdX, the largest ad exchange, transacted over [REDACTED] in the market I define during this period – i.e., over [REDACTED] times more – in the U.S. alone.

⁴⁴⁰ Note that this is all assuming Professor Baye's methodology to identify these exchanges is reliable which, in Appendix C, I demonstrate it is not. None of the exchanges in Figure 9 of Professor Baye's report are among the third party exchanges he uses in his market share analysis. Some of entities listed are not exchanges at all, e.g., Criteo, an ad buying tool is listed among a few ad networks (e.g., AdForm and Outbrain) and publishers/advertisers (Zillow). The largest exchange Professor Baye identifies (Amazon) is also not actually an exchange but a DSP. This is another sign of the issues with relying on identification of competitors by name using DFP data as Professor Baye does. My calculation of AdX's impression volume includes transactions via Open Auction and First Look only.

⁴⁴¹ Baye Report, ¶58.

⁴⁴² Baye Report, Figure 57.

⁴⁴³ Baye Report, Figure 57.

⁴⁴⁴ Baye Report, Figure 57.

its exclusive access to Google Ads demand. I also note that Professor Baye does not contest the point that publishers tend to single-home on one ad server. In my first report, I explained that publishers are limited in multi-homing between ad servers due to the costs of setting up an ad server.⁴⁴⁵

267. Professor Baye also presents misleading evidence regarding AdX publishers' multi-homing between selling inventory in the relevant market and inventory not in the relevant market (Exhibit 14 in Baye Report). I discussed some of the issues with Professor Baye's multi-homing analysis of AdX publishers, including the fact that the relevant analysis to perform is one of multi-homing of DFP publishers, not AdX publishers. In addition to the conceptual error, Professor Baye's calculations had several execution issues. I show Professor Baye's numbers with the due corrections in Appendix E.

c) Ad buying tools for small advertisers

268. In my Opening Report, I provided empirical evidence that multi-homing is rare for small advertisers⁴⁴⁶ and that the markets for ad buying tools present barriers to entry due to the importance of accumulation of data.⁴⁴⁷

269. Evidence of lack of multi-homing by small advertisers is relevant for Google Ads' market power in the market for ad buying tools for small advertisers. Professor Baye claims that data in the record shows this is not the case.⁴⁴⁸ However, Professor Baye's analysis neither speaks to small advertisers on Google Ads nor to the correct concept of multi-homing. Professor Baye claims that advertisers' multi-homing between ad-buying tools constrains Google's monopoly power.⁴⁴⁹

270. Professor Baye performs an analysis using AdX data that shows that approximately [REDACTED] Google Ads advertisers also use other ad buying tools.⁴⁵⁰ I have analyzed more comprehensive Google Ads data that shows that on average ~[REDACTED] small advertisers on Google Ads used display ads in 2016-2022. This means that only [REDACTED]% of small advertisers on Google Ads use more than one ad buying tool, even if for different purposes.⁴⁵¹

271. Second, multi-homing does not prove substitutability. As I showed in my Opening Report, and as I reiterate above, advertisers may use different ad buying tools to benefit from different offerings and

⁴⁴⁵ Gans Opening Report, Section V.C.2.

⁴⁴⁶ Gans Opening Report, ¶¶398-402.

⁴⁴⁷ Gans Opening Report, ¶¶403-405.

⁴⁴⁸ Baye Report, ¶347.

⁴⁴⁹ Baye Report, ¶58.

⁴⁵⁰ Baye Report, Figure 52.

⁴⁵¹ See Figure 37.

features.⁴⁵² For instance, Google acknowledged: “This often results in is [sic] media buying fragmentation—purchasing different buckets of media through different DSPs, networks, and channels. Maybe an advertiser loves the CTV offerings from The Trade Desk, our fiercest DSP competitor, they buy all their CTV through The Trade Desk. They also love YouTube and buy YouTube through Google Ads. And they always negotiate a yearly deal with New York Times that they buy directly with the publisher outside of a DSP.”⁴⁵³ This indicates complementarity rather than substitution. In the case of a price increase, an advertiser would not be able to purchase the same media mix from one tool only. For instance, an advertiser would still need to use Google Ads to buy search advertising.

272. Figure 33 and Figure 34 show that advertisers use Google Ads and DV360 for different purposes. Ad buying tools and, in particular, Google’s ad buying tools, have access to different types of inventory. So, advertisers may use, say, one tool for advertising on Google Search and YouTube (Google Ads) and another for open web display. Even if for different purposes, small advertisers find it costly to use more than one ad buying tool and stick with Google Ads.⁴⁵⁴ The data on the record does not allow for a breakdown of what type of inventory advertisers using more than one ad buying tool are purchasing. However, it is well documented in the industry how many of the ad buying tools shown in Professor Baye’s figure specialize in certain types of inventories. For example, Criteo specializes in retargeting.⁴⁵⁵ Yahoo, Microsoft, LinkedIn and Amazon shown in Professor Baye’s figure sell their own inventory not accessible by general-purpose ad buying tools.⁴⁵⁶ This evidence leads me to conclude that advertisers using Google Ads and one of these non-Google ad buying tools are generally purchasing different products via each tool and, consequently, not multi-homing.

273. Professor Baye also opines that advertisers multi-home between ad buying tools for small advertisers like Google Ads and ad buying tools for large advertisers like DV360, making it inconsistent with distinct markets for ad buying tools for small and large advertisers.⁴⁵⁷ I explain above why ad buying tools for small and large advertisers are not substitutes. Moreover, Professor Baye’s claim that advertisers

⁴⁵² Gans Opening Report, ¶283. (“Google acknowledges that some large advertisers choose to use ad buying tools for small advertisers for their various advertising goals. [REDACTED], Director of Product Management at Google, explains: “GDN and DBM are not competitive. They’re complementary.” Google defines this as “media buying fragmentation”, which leads advertisers to “purchas[e] different buckets of media through different DSPs, networks, and channels.” Google has a playbook for advertisers to “best leverage Google Ads and DV360 Together”)

⁴⁵³ GOOG-AT-MDL-006787342 at -369. “CG&E M&A Programmatic Training” (January 27, 2022). Google presentation for an internal training on programmatic topics.

⁴⁵⁴ Gans Opening Report, ¶398-402.

⁴⁵⁵ GOOG-TEX-00997803 at -806, 807. “Criteo: solution overview” (Undated.) Internal Google document providing an overview of Criteo. (“While Criteo claims it is a full funnel solution, their technology is entirely limited to retargeting...[Also,] Criteo provides a limited set of dimensions and metrics for self-serve reporting, and won’t include important dimensions for data such as the domain where an ad appears, or audience segmentation and information.”)

⁴⁵⁶ GOOG-TEX-01201334 at -362. “Buyside Deep Dive” (March 2018). Internal presentation on buy-side tools.

⁴⁵⁷ Baye Report, ¶48.

can easily switch between Google Ads and DV360 does not undermine Google's monopoly power. On the contrary, Google would be able to recoup any potential substitution between either tool.

274. In his report, Professor Ghose claims that "high transaction volumes and large scale of data are not substantial barriers to entry."⁴⁵⁸ His opinion relies on two main points: (1) Google is not the only player that has access to a large volume of data; (2) Data has diminishing returns to scale.

275. Professor Ghose's opinions are not sufficient to challenge the fact that high transaction volumes and large scale of data act as substantial barriers to entry, as the empirical evidence shown in my Opening Report led me to conclude.⁴⁵⁹

276. Professor Ghose claims Google is not the only player that has access to a large volume of data.^{460,461} Professor Baye, in contrast, simply posits that Google's data advantage stems from innovation without challenging its existence.⁴⁶²

277. While I do not contest that some other players might have access to large amounts of data, this does not challenge the fact that large scale of data can be a substantial barrier to entry. As I acknowledged in my Opening Report, data is a non-rivalrous good.⁴⁶³ However, Professor Ghose does not address how an ad-buying tool could achieve sufficient scale unless it could assemble a large number of customers and then develop algorithms that successfully bid on inventory. His claim that firms can buy data from brokers simply reinforces the point that data is essential to compete effectively. I also note that Professor Ghose omits the evidence I presented in my Opening Report, such as evidence from the CMA, and Google internal documents.⁴⁶⁴

278. Professor Ghose opines that data has diminishing returns to scale.⁴⁶⁵ Professor Ghose's claim that research shows that data has diminishing returns to scale is weak. He relies on one working paper that he mischaracterizes. The author of the paper states that to determine whether an incumbent data advantage can lock out competitors, one needs to perform a "case-by-case evaluation [...], as these factors depend significantly on the domain and context."⁴⁶⁶ This includes evaluating data quality, scale and scope of data,

⁴⁵⁸ Ghose Report, Section VI.B.

⁴⁵⁹ Gans Opening Report, V.E.3.

⁴⁶⁰ Ghose Report, ¶165.

⁴⁶¹ Ghose Report, ¶175, ¶176.

⁴⁶² Baye Report, ¶346.

⁴⁶³ Gans Opening Report, ¶334.

⁴⁶⁴ Gans Opening Report, Section V.E.3.

⁴⁶⁵ Ghose Report, ¶188.

⁴⁶⁶ Iansiti, Marco, "The Value of Data and Its Impact on Competition," *Harvard Business School NOM Unit Working Paper No. 22-002*, (2021), available at <http://dx.doi.org/10.2139/ssrn.3890387>.

A. Tying

282. In my Opening Report, I describe Google's history of using its monopoly power in the ad exchange market to limit competition in the ad server market.⁴⁷² In 2016, Google contractually tied AdX to DFP.^{473,474} Google could have chosen not to impose such restrictions on publishers and, as I opine in my Opening Report, could have created this functionality within DFP with minimal effort, including, notably, for real-time bidding into AdX.⁴⁷⁵ As a result, the combination of "must have" demand, as well as restrictions on how that demand could be transacted, meant that Google was able to foreclose other ad servers that may have competed with DFP.⁴⁷⁶ The harm from this is that publishers had fewer options, and the likelihood of entry into the publisher ad server market was greatly diminished.

283. I show that Google's tying conduct ("Google's tie") meets all the requirements of an anti-competitive tying arrangement. Moreover, I explain that this tie, in particular, raises barriers to entry in the ad server market where Google already has a monopoly market share.

1. The economics of tying

284. A tie exists when, in order to use Product A, a consumer must also use Product B.⁴⁷⁷ Economists have shown that (1) tying can raise rivals' costs,⁴⁷⁸ (2) tying can deter entry,⁴⁷⁹ and (3) tying can protect market power in the tying or tied markets.⁴⁸⁰ But as I discussed in my Opening Report, tying can have

⁴⁷² See Gans Opening Report, ¶¶415-417.

⁴⁷³ Gans Opening Report, ¶416. ("Starting in 2016, Google contractually tied its ad exchange (AdX) and its publisher ad server (DFP), meaning that publishers wanting to access AdX demand in any form (in real-time or otherwise) were forced to sign a combined DFP-AdX contract.").

⁴⁷⁴ Professor Baye states that my conclusions concerning the tie are contradicted by the documents I use to support my opinion. (See Baye Report, ¶455.) This is false. In fact, Professor Baye completely misrepresents the context of the document I cite in my Opening Report when he attempts to prove the document contradicts my point. (See, GOOG-TEX-00089241 at -241, -242. "Re: [REDACTED] ..." (October 15, 2015). Internal Google email thread with [REDACTED]). The actual message being conveyed is that the ad server is no longer needed, and Google is concerned that [REDACTED]

⁴⁷⁵ Gans Opening Report, ¶435. ("as early as 2009, Google had technology [REDACTED] Google, however, elected not to bring that technology to market.").

⁴⁷⁶ I support this claim with testimony from deponents later in this section.

⁴⁷⁷ As John McCain once complained: "when I go to the grocery store to buy a quart of milk. I don't have to buy a package of celery and a bunch of broccoli... I don't like Broccoli" (U.S. Senator John McCain, interview with *Washington Post*, C1, March 24, 2004).

⁴⁷⁸ Nalebuff, Barry, Bundling, "Tying, and Portfolio Effects," *DTI Econ. Paper* No. 1, 96 (2003); Krattenmaker, Thomas G., and C. Salop. "Anti-competitive Exclusion: Raising Rivals' Costs To Achieve Power over Price." *The Yale Law Journal* 96, (1986).

⁴⁷⁹ Nalebuff, Barry "Bundling as an Entry Barrier," *Quarterly Journal of Economics*, vol.160 (2004):159; Whinston, Michael D., "Tying, Foreclosure, and Exclusion," *Am. Econ. Rev.* vol.80. (1990):837.

⁴⁸⁰ Carlton, Dennis W. & Michael Waldman, "The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries," *Rand J. Econ.* 33 (2002): 194; Elhauge, Einer, "Tying, Bundled Discounts, and the Death of the Single Monopoly Profit Theory," *Harv. L. Rev.* 122 (2009): 397.

efficiency explanations, such as price coordination, metering or price discrimination.⁴⁸¹ As I explained in my Opening Report, Google's tie protects its monopoly power in the ad server market.

285. Professor Baye provides several examples of tied products that are products "sold only with another product."⁴⁸² In each of the examples, the products in question are arguably complements – that is, products whose value to consumers is higher when they are both consumed together rather than one or the other in isolation. Professor Baye opines that hot dog vendors tie hot dogs to buns.⁴⁸³ While it is true that this is a typical menu item, most hot dog vendors, in my experience, will sell you a hot dog without a bun for a discount or sometimes with a gluten-free bun, which may cost a little extra. Thus, there is no "forced" consumption. None of the options that Professor Baye lists are actually tied products.⁴⁸⁴ Even Apple laptops are not tied in that Apple will sell you the same computer without a monitor, allowing you to install different operating systems, without a keyboard and without a trackpad.

2. The existence of a tie

286. In my Opening Report, I described the evolution of Google's tying conduct.⁴⁸⁵ After a series of less prohibitive restrictions, Google imposed a contractual tie: in order to access AdX, publishers had to buy DFP.

287. [REDACTED], Product Go-to-Market lead at Google, and Google's 30(b)(6) witness, testified that customers without DFP but who used AdX "[REDACTED]". Customers could only choose [REDACTED].

[REDACTED]⁴⁸⁶

⁴⁸¹ Bowman Jr, Ward S. "Tying arrangements and the leverage problem." *Yale Lj* 67 (1957): 19.; Adams, William James & Janet L. Yellen, "Commodity Bundling and the Burden of Monopoly," *Q.J. Econ.* 90, (1976): 475; McAfee, R. Preston, John McMillan & Michael D. Whinston, "Multiproduct Monopoly, Commodity Bundling, and Correlation of Values," *Q.J. Econ.* 104, (1989): 371; Bakos, Yannis & Erik Brynjolfsson, "Bundling Information Goods: Pricing, Profits, and Efficiency," *Mgmt. Sci.* 45 (1999): 1515; Schmalensee, Richard, "Commodity Bundling by Single-Product Monopolies," *J.L. & Econ.* 25 (1982): 67.

⁴⁸² Baye Report, ¶446.

⁴⁸³ Baye Report, ¶446.

⁴⁸⁴ Baye Report, ¶446, Footnote 771.

⁴⁸⁵ Gans Opening Report, ¶416-417 ("Google's systematic efforts to exclude competition and increase monopoly power in the ad server market followed the chronology below, which I explain in subsequent sections of this report:").

⁴⁸⁶ Deposition of [REDACTED] (Product Go-to-Market lead, Google). 75:5-76:25. April 12, 2024.

288. Although Professor Baye opines that the contractual tie did not exist,⁴⁸⁷ his opinion is contrary to the fact that Google understood what they were doing as part of their clearly articulated [REDACTED] strategy to prevent [REDACTED]. Indeed, I note that this is precisely the type of conduct that Professor Baye (and his co-authors) argued would not arise in relation to the DoubleClick acquisition by Google that he examined in 2008.⁴⁸⁸

a) Access to AdX outside of DFP

289. Professor Baye claims that access to AdX is open to publishers without DFP. He claims that [REDACTED] % of publishers reach AdX from outside DFP.⁴⁸⁹ Professor Baye's calculation is misleading. As I show in Appendix G, Professor Baye makes two major errors. First, he sums his numbers over the pre-tying period and the tying period. Second, he measures only the number of publishers, not impressions which measures the impact of the foreclosure.

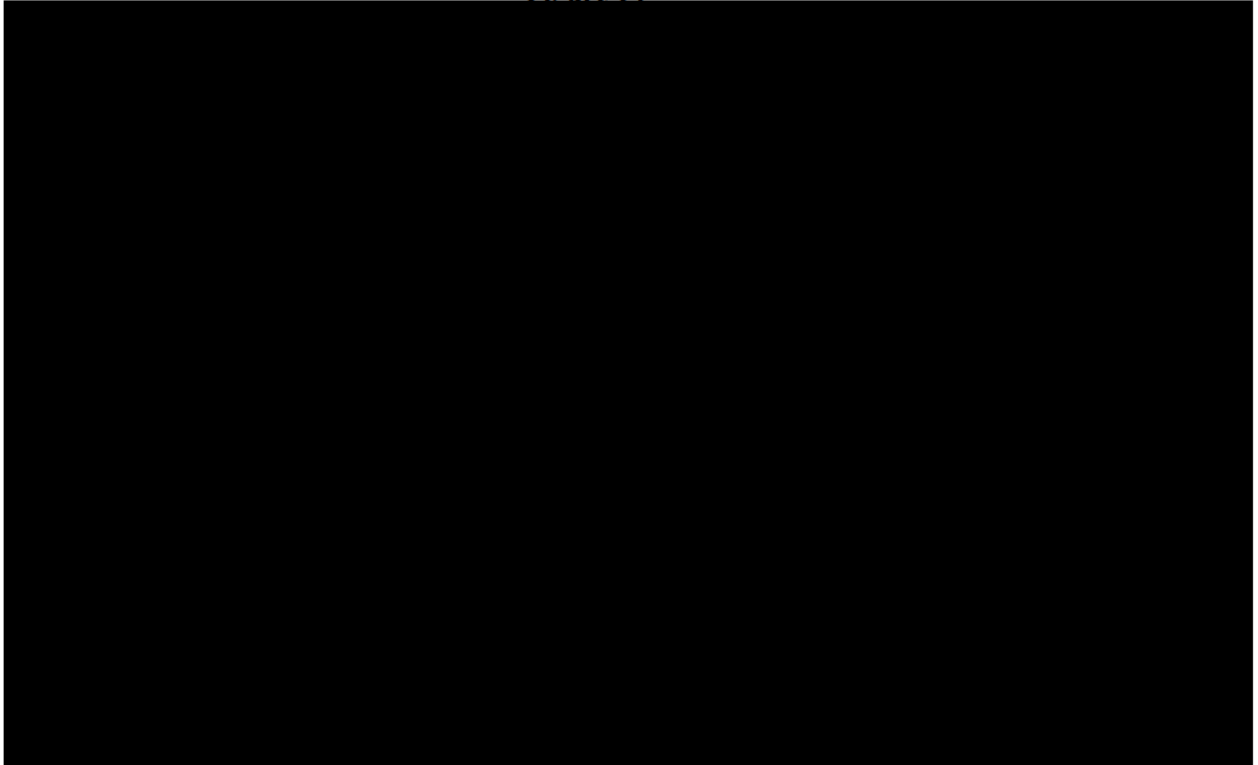
290. The Google tie created a barrier to entry for ad server competitors and new entrants. Figure 14 shows the share of AdX impressions coming from a source outside of DFP.

⁴⁸⁷ Professor Baye suggests the tie is "not actually a tie of one product to another (i.e., DFP to AdX), but rather a choice by Google to provide certain functionality of AdX (i.e., real-time bids) only to publishers using its integrated server, DFP" (*see* Baye Report, ¶ 472). This is merely the definition of a tie.

⁴⁸⁸ Baye, Michael R., Matias Barenstein, Debra J. Holt, Pauline M. Ippolito, James M. Lacko, Jesse B. Leary, Janis K. Pappalardo, Paul A. Pautler, and Michael G. Vita. "Economics at the FTC: The Google-DoubleClick merger, resale price maintenance, mortgage disclosures, and credit scoring in auto insurance." *Review of Industrial Organization* vol.33.(2008): 211-230 at 215 ("Essentially, the complainants contended that the transaction would facilitate the "leveraging" of pre-existing market power from one antitrust market into another (currently competitive) market, thereby creating an additional market distortion. More specifically, it was claimed that post-transaction, DoubleClick's DFP (the product that allegedly enjoyed substantial pre-merger market power) and Google's AdSense would be sold as a bundle, thereby taking away sales from AdSense's rivals, inducing their exit (thus altering the structure of the ad intermediation market), and thereby conferring market power on AdSense.") and ("As the FTC noted in its closing statement, the evidence did not support the proposition that DoubleClick possessed significant market power in ad serving. Without this initial condition, the leveraging story cannot work. Moreover, there was no evidence to support the proposition that ad intermediation is characterized by substantial scale economies. Indeed, the current fragmented structure of that market and the recent history of entry contradict that possibility. We also saw no evidence indicating a commitment irreversibly to tie or bundle Google's AdSense with DoubleClick's ad servers. All of the concerns raised by complaining rivals during the investigation alleged the possibility of what might be called "contractual" tying, such as contractually requiring the joint use of AdSense and DoubleClick's services or offering preferential pricing for customers who do use them together. We saw no evidence that such contracts would be used; but more importantly, as the literature on bundling emphasizes, contracts lack commitment power. Without such commitment power, entry cannot be profitably deterred.") I note that Professor Baye appears to continue to see "no evidence" of this.

⁴⁸⁹ Baye Report, ¶463.

Figure 14



291. It is clear from Figure 14 that the share of AdX impressions from outside DFP [REDACTED] after the Google tie in 2016 when Google restricted access to AdX to only DFP users. By 2021, only [REDACTED] percent of AdX impressions, or [REDACTED] percent of AdX revenue, emanate from outside of DFP.⁴⁹¹

292. The market participants view the Google tie as prohibitive. [REDACTED]

[REDACTED]⁴⁹² [REDACTED]
[REDACTED]⁴⁹³ [REDACTED]

⁴⁹⁰ RFP 243 AdX Submission data is used for this analysis. The column “country criteria id” is filtered to be “2840,” which represents the US. The column “is_mobile_app_request” is filtered to be “False.” The column “transaction_type_name” is filtered to be values not related to “Open Bidding.” A publisher is defined by “web_property_id.” All publishers with non-positive “gross_rev_usd” are excluded. Impressions are not from DFP if the column “publisher_ad_server” is not equal to “GAM.” The share of impressions is calculated as the ratio of the impression that are not from DFP and the total impressions in the data with the filters. The column “matched_impressions” is used to calculate the share and it gives similar result to use the column “impressions.”

⁴⁹¹ FP 243 AdX Submission data is used for this analysis. The column “country criteria id” is filtered to be “2840,” which represents the US. The column “is_mobile_app_request” is filtered to be “False.” The column “transaction_type_name” is filtered to be values not related to “Open Bidding.” A publisher is defined by “web_property_id.” All publishers with non-positive “gross_rev_usd” are excluded. Impressions are not from DFP if the column “publisher_ad_server” is not equal to “GAM.” The column “gross_rev_usd” is used to calculate revenue.

⁴⁹² [REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] 494 [REDACTED]

[REDACTED]

[REDACTED] 495 [REDACTED]

293. The publishers that access AdX from outside of DFP are publishers using AdX Direct.⁴⁹⁶ But AdX Direct is functionally inferior and its use is in steep decline.⁴⁹⁷ Google's 30(B)(6) witness, [REDACTED], testified that all publishers with AdX Direct would [REDACTED]

[REDACTED]

[REDACTED] 498 The deponents in this case understood that access to AdX was limited to DFP users.

294. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] 494 [REDACTED]

[REDACTED]

[REDACTED] 495 [REDACTED]

[REDACTED]

⁴⁹⁶ Gans Opening Report, ¶429. ("Historically, publishers used multiple ad tags, each associated with a different demand source. Google offered publishers two types of ad tags. The first, known as "AdX tags" (also referred to as AdX Direct Tags), enabled AdX to be called by third-party ad servers to serve an ad.").

⁴⁹⁷ Deposition of [REDACTED] (formerly [REDACTED]) 129:3-5, November 9, 2023. [REDACTED]

⁴⁹⁸ Deposition of [REDACTED] (Product Go-to-Market lead, Google). 23:8-324:3, 325:24-326:3. April 12, 2024. ("(Counsel): What is AdX Direct? [REDACTED] AdX Direct is when a pub -- when someone uses an ad -- an Ad Exchange tag trafficked directly in an ad server. (Counsel): And do publishers who use AdX Direct have a contract with Google with respect to AdX Direct? (Ms. Wilbur): There is no contract specifically for AdX Direct. (Counsel): And do you know why that is? (Ms. Wilbur): [REDACTED]

[REDACTED]

499

295. [REDACTED]

[REDACTED]

500

296. Professor Baye opines that “the data and documentary evidence are inconsistent with the conclusion that Google tied DFP to AdX.”⁵⁰¹ On the contrary, it is evident that Google contractually tied DFP and AdX into one product known as Google Ad Manager (“GAM”) in 2016 and required all new AdX partners and publisher accounts to enlist in the new tied product, rather than allowing contracts for DFP and AdX to continue to be created.⁵⁰²

499

[REDACTED]

500

[REDACTED]

⁵⁰¹ Baye Report, ¶442.

⁵⁰² Professor Baye argues that I ignore documents that indicate the business rationale for the unified contract and provide no evidence that signing the unified contract forced AdX publishers to use DFP or prevented AdX publishers from using 3PE. (*See* Baye Report, ¶473). These are irrelevant arguments. The significance of the unified contract is that it reduced publisher choice and required all new AdX partners and publisher accounts to enlist in the new tied product, rather than allowing contracts for DFP and AdX to continue to be created. AdX-only partners had to either recontract under the new unified contract or be terminated. Google offered no other option to partners to keep the AdX only contract.

[REDACTED] 504

503 GOOG-AT-MDL-019416878 at -879. "Scalable Comms -

504 [REDACTED]

505 [REDACTED]

299. [REDACTED] further confirmed that even if a publisher was in good standing on their existing contract, including complying with all contract requirements and payments, Google would still have [REDACTED] if they did not recontract under the new unified DFP/AdX contract.⁵⁰⁶

b) Access to Google Ads outside of AdX

300. Professor Baye states that Google chose “to have Google Ads bid primarily into AdX”.⁵⁰⁷ However, he then opines that a significant amount of Google Ad spend is transacted through third-party exchanges, with the transaction amount increasing “from \$[REDACTED] in June 2016 to \$[REDACTED] in January 2023.”⁵⁰⁸ Again, this is a gross exaggeration. Figure 15 shows, the share of monthly impressions transacted by Google Ads advertisers through different exchanges. The figure shows that less than [REDACTED] % of Google Ads web display ad spend is transacted on exchanges other than AdX since 2017.

[REDACTED]

⁵⁰⁶ Deposition of [REDACTED]

⁵⁰⁷ Baye Report, ¶465.

⁵⁰⁸ Baye Report, ¶467.

Figure 15



301. Deponents, in this case, consider access to Google Ads demand outside of AdX foreclosed. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] 510

⁵⁰⁹ Source: RFP 243 – Google Ads Submission. Impressions by inventory source limited to web display ads.
⁵¹⁰

[REDACTED]

302. [REDACTED]
[REDACTED]
[REDACTED] 511

303. [REDACTED]
[REDACTED]
[REDACTED] 512

304. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] 513

305. Internal Google documents and testimony highlight that Google recognized AdX had exclusive access to GDN demand⁵¹⁴ and was aware of the importance of this exclusive AdWords demand access for its competitive position.⁵¹⁵

306. Access to Google Ads outside of AdX can be obtained using Google's AwBid tool. But it is intentionally limited "to specific impressions."⁵¹⁶ Google also charges higher prices for using this tool,

511 [REDACTED]
[REDACTED]
512 [REDACTED]
[REDACTED]
513 [REDACTED]
[REDACTED]
[REDACTED]
514 [REDACTED]
[REDACTED]
[REDACTED]

⁵¹⁵ GOOG-TEX-00701689 at -690. "Thoughts on Display & Video Ads Strategy" (undated) Internal Google Document ("Without a display O&O anchor, our primary selling point has been exclusive access to AdWords demand ...", presentation also contains chart identifying Google's competitive differentiators which on the sell-side includes "Exclusive AW Demand")

⁵¹⁶ Professor Baye fails to mention that only [REDACTED] unique exchanges have access to AWBid, and of those, only [REDACTED] pay advertisers. Based on 1-month log-level sample filtered to auctions for ads served in the US.

“between █% for remarketing inventory and █% for other targeting types.”⁵¹⁷ This represents a high take rate to purchase impressions on non-Google exchanges compared to the █% rate when Google Ads buys impressions through AdX.

3. The existence of two distinct products

307. Prior to Google’s tie, DFP and AdX were separate distinct products. Google’s 30(b)(6) witness, █, Managing Director of Global Publisher Platforms at Google testified that AdX and Google Ad Manager “mean two separate things.” This is because the technology is different, and each product serves different functions: “Ad Manager is the ad server that the publishers licensed that they sit on. AdX is a technology that actually brings the advertising dollars to the publisher.” As she explained, there is separate demand for an ad server and an ad exchange.⁵¹⁸

308. Third parties also viewed DFP and AdX as distinct. █
█
█.⁵¹⁹

309. Under the unified GAM contract, DFP and AdX remain distinct features in a single platform.⁵²⁰ Google 30(b)(6) deponent █ described merging AdX and DFP into a unified product as “taking two independent products and merging them.”^{521,522}

⁵¹⁷ Pathak expert report, ¶237.

⁵¹⁸ Deposition of █ (Managing Director of Global Publisher Platforms, Google). 77:15-79:11. May 1, 2024. (“(Counsel): So when we’re discussing your role, is it helpful to distinguish AdX from Google Ad Manager? (█): It is helpful. It means two separate things. (Counsel): And why does it mean two separate things? (█): The technology’s different, ma’am. (Counsel): Why is the technology different? [...] (█): It’s two separate pipes that serves two separate bus- -- two separate functions. (Counsel): And we’re -- when we say “two separate pipes,” for clarity, we’re referring AdX and then Google Ad Manager or GAM, correct? (█): That’s correct. (Counsel): And when you say “two separate functions,” can you explain AdX’s separate function? [...] (█): Okay. So just to clarify, Ad Manager is the ad server that the publishers licensed that they sit on. AdX is a technology that actually brings the advertising dollars to the publisher. A publisher may not necessarily need to use AdX. Sometimes they do; sometimes they don’t. Hence, the reason to separate. So an ad server is GAM. AdX is a technology that brings the dollars in. Not the same thing.”)

⁵¹⁹ █

⁵²⁰ Deposition of Yoni Wilbur (Product Go-to-Market lead, Google). 138:24-139:19. April 12, 2024. (“(Counsel): But even under one contract, the product still remained distinct. Correct? [...] (Ms. Wilbur): No, it was -- also became a unified product. (Counsel): But the ad server elements and the Ad Exchange element, those still, to this day, are distinct elements. Correct? [...] (Ms. Wilbur): That’s not correct. They are features in a single platform. (Counsel): They are distinct features in a single platform. Correct? [...] (Ms. Wilbur): Yes.”)

⁵²¹ Deposition of █ (Product Go-to-Market lead, Google). 208:11-209:4. April 12, 2024. (“(Counsel): I think that’s helpful to split them up. So you’re not the -- we’ll take the first piece, right? The merging the AdX/DFP products into a unified product, that was not merely a name change. Correct? (█): Yes. (Counsel): Okay. That was -- that was product changes, right? Taking two formerly separate products and rebranding them as a single product. Correct? [...] (█): That was taking two independent products and merging them into a single, unified product, yes.”)

⁵²² Deposition of █ (Product Go-to-Market lead, Google). 138:5-138:10. April 12, 2024. (“(Counsel): And so prior to DRX, which is also GAM, DFP and AdX were formerly different, distinct products. Correct? (█): Yes.”)

310. My opinion in my Opening Report, that separate products exist⁵²³ is not contested by Professor Baye and is supported by Google's testimony.

4. Market power in the tying market

a) AdX has market power

311. In my discussion of market power, I described how AdX has monopoly power, as evidenced by its large market share in a market with barriers to entry. I found in my Opening Report that Google's AdX had a "dominant and growing market share over time" greater than █%, and "high barriers to entry"⁵²⁴ Above, I showed that AdX may have more than █% market share.

b) AdX is a unique product

312. It is my understanding that sufficient economic power in a tying market can mean that the Google's tying product is unique. Publishers need AdX to reach advertisers that use Google Ads. Google Ads is the only avenue that advertisers have to purchase Google Properties, such as YouTube, as well as AdSense.

525

313.

526

⁵²³ Gans Opening Report, ¶414 (“The conditions for competitive injury from tying are present in this case. Here, Google tied its AdX ad exchange with its DFP ad server. These are independent products with separate demand for each product.”).

⁵²⁴ Gans Opening Report, ¶370 (“find that Google has market power in this market. Google’s market power is evident because of the following factors: a. Dominant and growing market share over time b. High barriers to entry due to indirect network effects c. There has been no recent history of entry”) see Nalebuff, Barry “Bundling as an Entry Barrier”, 160 *Quarterly Journal of Economics*, vol.160(2004):159.

525

526

5. Google's tie is anti-competitive

314. In my initial report I demonstrated that the tying led to significant anti-competitive harm. I showed that the Google tie increased Google's monopoly power in ad servers and blockaded entry.⁵²⁷ Professor Baye opines that I did not undertake the correct methodology to assess this harm and also that his data indicates there was no such harm.

315. Instead, Professor Baye opines that:

Professor Gans also fails to provide data analysis that would demonstrate that the alleged tie prevented rivals from achieving minimum efficient scale, drove them out of business, or otherwise reduced the number of competitors. Without such data analysis it is *impossible* to determine reliably whether the alleged tie was more likely procompetitive—as most such ties are—or had anti-competitive effects on customers.⁵²⁸

316. But immediately thereafter, Professor Baye asserts:

To reliably determine whether an alleged tie is anti-competitive, one *must* examine the business practice holistically to account for externalities and indirect network effects across the entire ad tech stack.⁵²⁹

317. Clearly “data analysis” is not the same as a holistic analysis. I considered both the data available in this case, Google's testimony, and the fact depositions in this case. The evidence shows that the purpose and effect of the tie was to limit competition.^{530,531,532}

318. Professor Baye claims that many publishers use DFP for purposes other than accessing AdX. He claims this shows that publishers would choose DFP even if no tie existed.⁵³³ But again, his numbers are gross overstatements. He presents numbers of publishers summed over both the pre-tying and tying period.⁵³⁴ In fact, beginning with the tie in 2016 and continuing after, the number of impressions (the more important variable) sold by DFP publishers not using AdX [REDACTED]. By 2021, DFP publishers who did not use AdX were selling less than [REDACTED] percent of impressions in DFP.⁵³⁵

⁵²⁷ See Gans Opening Report, ¶449 – 452.

⁵²⁸ Baye Report, ¶451. Emphasis added.

⁵²⁹ Baye Report, ¶453. Emphasis added.

⁵³⁰ Baye Report, ¶453.

⁵³¹ I note that the lead tying case in the Supreme Court, *Jefferson Parish Hospital District No. 2 v. Hyde*, 466 U.S. 2 (1984), involved a two sided platform.

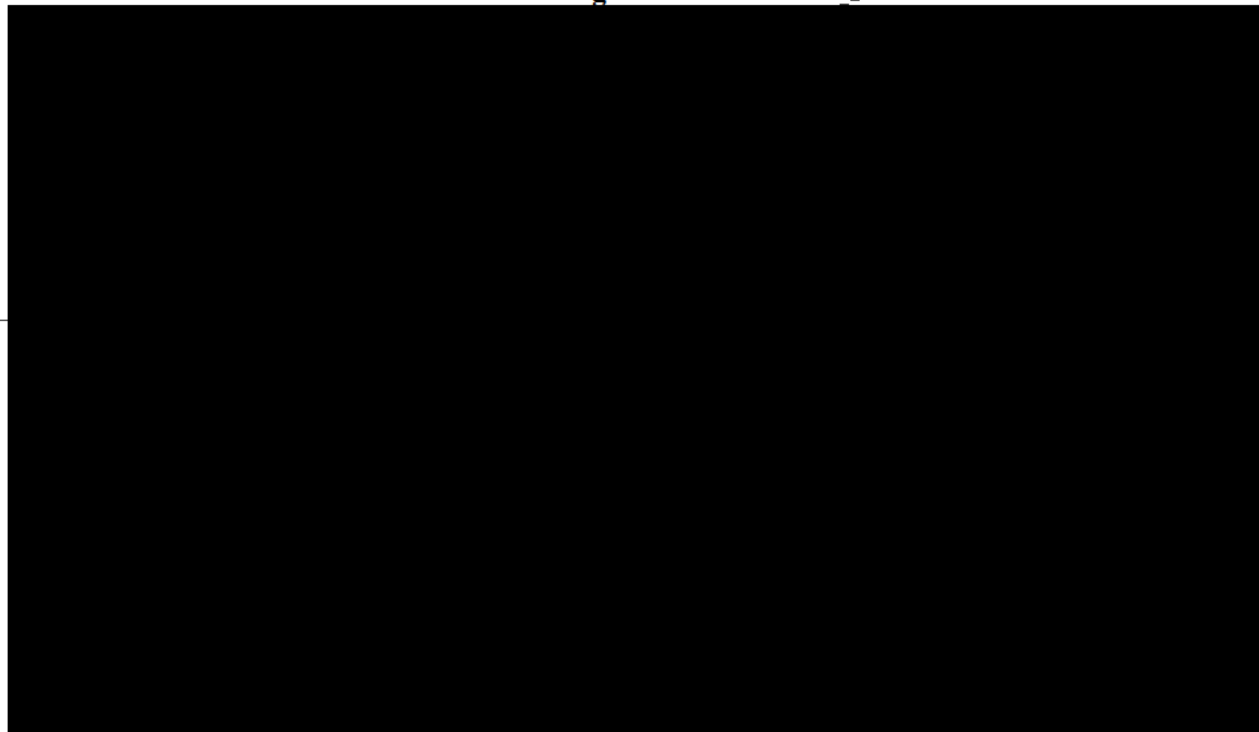
⁵³² That said, Professor Baye has not provided any holistic examination of externalities and indirect network effects in relation to his assessment of the tying conduct of Google. Professor Baye also opines that somehow tying does not apply in multi-market situations.

⁵³³ Baye Report, ¶78.

⁵³⁴ See Appendix G.

⁵³⁵ RFP 243 DFP Reservations data, AdX data, and AdSense Backfill data are used for this analysis. In these datasets, the column “country_criteria_id” is filtered to be “2840,” which represents the US. In the AdX data, the column “is_adx_direct” is filtered to

Figure 16



319. Professor Baye claims that [REDACTED] percent of publishers used DFP without AdX,⁵³⁷ but these publishers represent an insignificant amount of DFP impressions, as shown in Figure 16. This data shows that the publishers that could generate profits for a competing ad server or new entrant are foreclosed by the Google tie. The data does show that most publishers would keep DFP and not switch to competitors absent the tie. That is, absent the tie, publishers could switch to a competing ad server or new entrant, and competition would not be foreclosed.

320. Professor Baye also makes the argument that Google had a substantial market share in ad servers before the tie.⁵³⁸ He claims that means that those publishers are unaffected. Professor Baye misunderstands how tying harms competition in the tied market. Before the tie, a competitor or entrant could persuade a

be “False.” Rows with non-positive impressions are excluded. A DFP publisher who did not use AdX is defined when the “gfp_network_id” is in the DFP Reservations data or AdSense Backfill data, but not in the AdX data with transaction type related to “Open Bidding.” These datasets are aggregated and matched at the “gfp_network_id” and year level. A publisher is defined by “gfp_network_id.” The share is calculated as the ratio of the following two impression counts in each year: (1) the number of impressions from DFP publishers who did not use AdX, and (2) the number of impressions in all three datasets.

⁵³⁶ RFP 243 DFP Reservations data, AdX data, and AdSense Backfill data are used for this analysis. In these datasets, the column “country_criteria_id” is filtered to be “2840,” which represents the US. In the AdX data, the column “is_adx_direct” is filtered to be “False.” Rows with non-positive impressions are excluded. A publisher is defined by “gfp_network_id.” These datasets are aggregated and matched at the “gfp_network_id” and year level. A DFP publisher who did not use AdX is defined when the column “transaction_type_name” is not related to “Open Auction” or “First Look.” The share is calculated as the ratio of the following two impression counts in each year: (1) the number of impressions from DFP publishers who did not use AdX, and (2) the number of impressions in all three datasets.

⁵³⁷ Baye Report, ¶463.

⁵³⁸ Baye Report, ¶444.

321. [REDACTED]
[REDACTED] 539 [REDACTED]
[REDACTED] 540 [REDACTED]
[REDACTED]

322. [REDACTED]
[REDACTED]
[REDACTED] 542

539 [REDACTED]

[REDACTED]

540 [REDACTED]

[REDACTED]

541 [REDACTED]

[REDACTED]

542 [REDACTED]

[REDACTED]

120

324. [REDACTED]
[REDACTED]
[REDACTED] 544

325. [REDACTED]
[REDACTED]
[REDACTED] 545

326. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] 546

327. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] 547

544

545

546

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328. [REDACTED]

548

549,550

6. Professor Baye offers no procompetitive justification for the Google tie

329. Professor Baye offers no procompetitive explanation for Google's tying in his report. He does not provide any benefits that are tying-specific or could only occur as a result of the tie. Instead, he opines that, while I was aware of pro-competitive benefits, I "ignored" pro-competitive justifications.⁵⁵¹ This is not the case. In my Opening Report, I opine that there was no evidence of procompetitive benefits from the tie.⁵⁵²

[REDACTED]

548 [REDACTED]

549 [REDACTED]

⁵⁵⁰ NewsCorp investment into AppNexus followed Google's new unified contract. *See* Yahoo!Finance. "NewsCorp just pumped \$10 million into ad tech company AppNexus as part of a \$31 million round" (September 28, 2016). Accessed September 3, 2024. <https://finance.yahoo.com/news/newscorp-just-pumped-10-million-150000508.html> ("While the announcement might just seem like another run-of-the-mill ad tech fundraise, the fact that two major publishers are the lead investors is likely a signal of intent towards AppNexus — and potentially away from the dominant publisher ad tech platform Google DoubleClick.").

⁵⁵¹ Baye Report, ¶448, Footnote 777.

⁵⁵² Gans Opening Report, ¶456. ("It is incumbent on any economist that analyzes a tying arrangement to consider potential procompetitive benefits from the tie. A typical defense offered for a tie is that joint control of the products allows better control of overall quality such as when parts are tied to service. In this case, I am not aware of any such benefits. In addition, ownership of complementary products can lead to lower prices if both products participate in competitive markets. That is also not the case here. If further benefits are suggested by Google, I plan to evaluate such claims.").

For instance, I examined whether providing real-time bids would be prohibitively costly and found that the evidence showed a low cost of allowing real-time bidding.⁵⁵³

330. Professor Baye lists improvements that Google made to DFP (and later GAM) but does not provide any argument as to those improvements being made because of restrictions imposed on publishers when using DFP.⁵⁵⁴ Google itself opined that the tie was a source of differentiation.⁵⁵⁵ The issue is whether it would be a source of differentiation in a competitive market or whether Google would have imposed the restrictions but for the combination of its market power and integration. In my initial report, I amassed substantial evidence that Google would not have created the tie in the absence of those factors⁵⁵⁶. Professor Baye, on the other hand, provides no opinion or evidence that the tie would have been created in the absence of those factors. Hence, when the evidence leads in one direction as it does here, it cannot be reasonably concluded that the tie is pro-competitive.

331. Professor Baye does, however, opine that the multi-sided nature of the industry, along with Google's vertical integration,⁵⁵⁷ may imply that it is reasonable to impose restrictions that might be otherwise harmful to one group of customers if those restrictions create benefits for customers on the other side of the market; using its integration to internalize such externalities.⁵⁵⁸ I disagree. In my opinion, all consumers are entitled to the benefits of competition. An anti-competitive conduct that harms one group but benefits another group is not a procompetitive justification.⁵⁵⁹ In this case, the beneficiaries are supposedly advertisers. However, at no point does Professor Baye provide an opinion or evidence that advertisers benefitted from the tie. Indeed, because the ad serving tools that could provide inventory to compete for advertiser demand on AdX were limited to DFP, the restriction on competition also limited supply to AdX advertisers using Google Ads.

B. Unified Pricing Rules

332. Unified Pricing Rules (UPR) were imposed in 2019 and involved Google restricting publishers who used its ad server tool (GAM) from being able to set different floor prices for different exchanges or

⁵⁵³ Gans Opening Report, ¶439. ("Moreover, the document clearly stated that the cost of Google pursuing this strategy was low. It claims that "minimal effort is require to roll [DA] out more" and that the effort required is only the commercialization of the product. See GOOG-NE-05243813 at -873, -874. "Display Strategy Working Document" (August 2012). Internal Google document explaining platforms and strategies.").

⁵⁵⁴ Baye Report, ¶496, ¶497.

⁵⁵⁵ GOOG-NE-05243813 at -873. "Display Strategy Working Document" (August 2012). Internal Google document explaining platforms and strategies. The strategy document showed that [REDACTED]

⁵⁵⁶ Gans Opening Report, Section VI.C.

⁵⁵⁷ But, at the same time, he denies the tie has resulted in any material integration at all. These arguments are inconsistent.

⁵⁵⁸ Baye Report, ¶453.

⁵⁵⁹ Katz, Michael, and Jonathan Sallet. "Multisided platforms and antitrust enforcement." *Yale Law Journal* 127 (2017).

bidder demand sources. Thus, it was a restriction imposed by Google at the ad server level to require equal treatment of AdX and non-Google sell-side platforms. UPR harmed publishers.⁵⁶⁰ Google's rationale here was explicitly to impose a restriction on customers in one market – the market for ad server tools – that was designed to alter behavior that impacted on other markets – the market for ad exchanges and the markets for advertiser tools.

333. Professor Baye asserts I am being inconsistent in “faulting Google” for treating rivals with unequal terms and faulting Google for setting uniform pricing rules that impose a constraint across them.⁵⁶¹ However, there is no inconsistency. The restrictions were imposed on Google's own customers, which prevents them from exercising competitive choice. Tying and UPR are examples of this. The auction manipulations described elsewhere hide Google's actual prices from its own customers, in turn, subverting their ability to exercise competitive choice. Thus, there is no inconsistency but instead an overarching pattern that characterizes Google's anti-competitive conduct.

334. Professor Baye deliberately mischaracterizes UPR as a feature rather than a constraint on publishers.⁵⁶² He asserts that “UPR *allowed* publishers to set price floors that applied equally to the GAM auction and to auctions run by third-party exchanges.”⁵⁶³ However, publishers could have already chosen to do this prior to UPR. UPR removed the ability that publishers had and used to vary price floors. Professor Baye notes that these floors “might be good for an individual publisher.”⁵⁶⁴ In saying even this, Professor Baye misses the point. The point is that *Google could have provided UPR functionality to make it easier for publishers to set unified pricing floors without actually imposing that as a requirement*. It is precisely the imposition of the restraint that is anti-competitive, apart from any benefits to a user interface Google might have implemented alongside UPR.

335. Professor Milgrom's evaluation of UPR focuses exclusively on effects across markets. In so doing, he recognizes that UPR represented a restriction that would constrain and hence, remove options for publishers and asserts that the purpose of UPR was to improve outcomes for advertisers.⁵⁶⁵ It did this by preventing publishers from employing a tactic that “would call the same bidders on different exchanges using different floor prices in an attempt to induce them to make unnecessarily high bids to win an impression.”⁵⁶⁶ Professor Milgrom calls this “price fishing,” although I note that the tactic of adjusting price

⁵⁶⁰ See Weinberg Opening Report, ¶12c, 169, 172, 180.

⁵⁶¹ Baye Report, ¶500.

⁵⁶² Baye Report, ¶502.

⁵⁶³ Baye Report, ¶502. Emphasis added.

⁵⁶⁴ Baye Report, ¶504.

⁵⁶⁵ Milgrom Report, ¶124.

⁵⁶⁶ Milgrom Report, ¶124.

floors to improve revenue for publishers is something that he opines that publishers ought to practice in response to other conduct as I explain below. For UPR, he asserts that, for advertisers, this creates difficulties that would “add costs” and make “bidding optimally more complicated.” Another way of putting this is that Professor Milgrom believes that advertisers will not be sophisticated enough to easily adjust to these tactics or would face costs involved in responding.⁵⁶⁷ As I will discuss below, when analyzing Google’s conduct elsewhere, Professor Milgrom downplays or dismisses precisely these same costs.

336. While concerns about balancing the competing interests of publishers and advertisers – both of whom are Google’s customers – may theoretically play a role in the implementation of UPR, Professor Milgrom provides no evidence to support that was Google’s actual intent when implementing UPR.⁵⁶⁸ Instead, as I argued in my initial report, the effect of UPR was to make it impossible for publishers using Google’s ad server (a market in which it possessed monopoly power) to use differential floors to counter differences in take rates and demand amongst exchanges and ad buying tools and optimize accordingly.⁵⁶⁹ While that task can be challenging given the many instances of non-transparency in the market, it is a necessary condition for competitive forces to operate, and UPR has foreclosed on such options.⁵⁷⁰

337. I note that Professor Milgrom recognizes publisher harm here and opines that publishers can use post-auction discounts instead to mitigate the effects of UPR or adjust their Header Bidding operations.⁵⁷¹ However, this is surely, as I have pointed out, a costly alternative for publishers. If ad servers were competitive, surely providers would instead allow publishers the option to set price floors flexibly.⁵⁷² Professor Milgrom additionally opines that not adjusting price floors is an industry “best practice” and that other providers (e.g., Xandr) recommend that publishers do not adjust pricing floors in this manner,⁵⁷³ but, again, Google could have simply recommended these behaviors rather than imposing it as a mandatory restraint.

⁵⁶⁷ Milgrom Report, ¶534.

⁵⁶⁸ Professor Baye supports his claim that UPR prevented multi-homing by citing a Google document. While this document talks about multi-homing as one of the justification for UPR, it is a reply to “some of the difficult PR [Google has] received on this launch.” Professor Baye does not provide any support from regular day-to-day business documents. The document he cites also shows that preventing multi-homing is pretextual. It states: “The reason we’re bundling these 2 launches together, is that moving to a first price auction provides us additional justification to remove some these controls [...]” See GOOG-DOJ-12948968 at -969. “Fwd: 1st Price Changes” (June 10, 2019). Internal Google email thread between [REDACTED]

⁵⁶⁹ Gans Opening Report, ¶482

⁵⁷⁰ Professor Baye (see Baye Report, ¶507) opines that only a few publishers were harmed by UPR although he does not examine the share of impressions being traded that this comprised. It is likely that larger publishers with more advertising inventory would take advantage of the ability to set differential price flows so these few publishers would be responsible for a disproportionate amount of supply. Nonetheless, it is interesting to note that in Professor Baye’s minimizing of the scope of UPR he, at the same time, is implying that its purported pro-competitive benefit for advertisers was correspondingly low.

⁵⁷¹ Milgrom Report, ¶524.

⁵⁷² See Gans Opening Report, ¶470.

⁵⁷³ Milgrom Report, ¶545.

My Opening Report lists several reasons publishers want to set differential price floors, including:

- a. Maximizing the sellers' long-term revenue⁵⁷⁵
- b. Fees charged by channels are different⁵⁷⁶
- c. The 'size' of each channel and the average quality of the buyers reached via each channel is different based on the number of buyers they are able to bring to the seller's auction⁵⁷⁷
- d. Ability to multi-home across channels rather than having to choose one or the other if the channels are not equivalent competitors⁵⁷⁸
- e. Control the ad quality displayed on their properties⁵⁷⁹

339. Additionally, Professor Milgrom does not offer any evidence disputing these reasons, and instead claims that DSPs are identical. However, as I opine in my Opening Report, DSPs and exchanges have different demand, and thus, are not identical.⁵⁸⁰ Google also recognized that DSPs are not identical.⁵⁸¹ DSPs

⁵⁷⁴ Gans Opening Report, ¶512. (“Third, Google buying tools have more information about users than third-party buying tools. As Google’s buying tools were more likely to identify high-demand impressions, setting higher pricing floors for Google’s buying tools allowed publishers to extract a larger share of the value of those high- demand impressions.”).

⁵⁷⁵ Reiley, David. "Field Experiments on the Effects of Reserve Prices in Auctions: More Magic on the Internet." *RAND Journal of Economics*. Vol. 37, no. 1 (2006): 195-211. ("This variation in reserve price levels was designed to investigate how both bidder behavior and expected auction revenue would react to changes in the reserve price, and to calculate the revenue-maximizing reserve price level").

⁵⁷⁶ Gans Opening Report, ¶470. (“Competitive publisher ad server providers will want to offer publishers the flexibility to set per-channel reserve prices if the fees charged by channels are different, the ‘size’ of each channel and the average quality of the buyers reached via each channel is different based on the number of buyers they are able to bring to the seller’s auction.”).

⁵⁷⁷ Gans Opening Report, ¶470. (“Competitive publisher ad server providers will want to offer publishers the flexibility to set per-channel reserve prices if the fees charged by channels are different, the ‘size’ of each channel and the average quality of the buyers reached via each channel is different based on the number of buyers they are able to bring to the seller’s auction.”).

⁵⁷⁸ Gans Opening Report, ¶470. (“This allows publishers to multi-home across channels rather than having to choose one or the other if the channels are not equivalent competitors”).

⁵⁷⁹ GOOG-DOJ-AT-01804815 at -820. “1st Price Migration Overview” (October 30, 2018). Internal Google Presentation. (“Pubs set higher floors on AdX for a variety of reasons [...] Perception that undesirable ads correlated with low CPMs, and higher floors “protect” them.”).

⁵⁸⁰ Gans Opening Report, ¶573 (“Not all exchanges host identical demand sources due to variations in DSP integration.”).

⁵⁸¹ GOOG-DOJ-AT-01811903 at -913. “A buy-side overview to publisher yield: Header Bidding, First Look, and Exchange Bidding” (November 2016). Internal Google presentation. (“There are many potential reasons for unique demand but here are a few common ones [REDACTED]”)

are highly differentiated by the data they have access to that informs pricing decisions.⁵⁸² Advertisers want to use the DSP that has the best data, particularly if they don't have much of their own data.⁵⁸³ For example, Header Bidding benefited publishers precisely because it generated access to additional demand.⁵⁸⁴

340. A 2018 internal Google presentation outlines other reasons publishers may want to set high floors on AdX, including:⁵⁸⁵

- a. [REDACTED]
- b. [REDACTED]
- c. [REDACTED];

⁵⁸² [REDACTED]

⁵⁸³ Competition & Markets Authority (CMA). "Online platforms and digital advertising." (July 1, 2020). Appendix F, p. 27. ("The ability to measure the effectiveness of advertising is an important driver of advertisers' decisions on how to allocate their advertising spend across publishers and platforms. Google and Facebook have an advantage in terms of being able to track consumers across their own walled garden 'ecosystem' and across a large number of third-party sites and apps. As a result, they are better able to demonstrate the effectiveness of using their platforms relative to others. This finding is supported by advertisers' submissions and responses to our interim report. For example, Beeswax, a DSP, submitted that Google had an advantage in measuring conversions from the data (both ad and non-ad data) it collected from its consumer products (see Appendix B)."); Appendix N, p. 14. ("Advertisers can also be motivated by numerous idiosyncratic factors in their choice of platforms. These can include for example: commercial agreements; restrictions due to the nature of their N15 products (eg gambling, pharmaceuticals); tech stacks and the capability to integrate data (ie DMPs)."). See also ECM. "19 Best Demand Side Platforms In 2024" (August 28, 2024). Accessed September 8, 2024. <https://theecommanager.com/tools/best-demand-side-platform/> ("Choosing the right demand-side platform (DSP) is crucial for optimizing your ad spend and reaching your target audience effectively. Here's a step-by-step guide to help you make the best choice: [...] Assess targeting capabilities. Examine the platform's targeting options and data integration features. Advanced DSPs should offer demographic, behavioral, contextual, and geographic targeting, along with the ability to integrate first-party and third-party data to enhance audience segmentation and campaign performance.")

⁵⁸⁴ GOOG-TEX-00105361 at -394. "FAN Bidding in to DRX and AdMob." (April 28, 2017). Internal Google presentation. ("Pros: [REDACTED].")

⁵⁸⁵ GOOG-NE-11809343 at -358. "DRX Unified Yield Management Strategy Review" (July 9, 2018). Internal Google PowerPoint on DRX. ("[REDACTED].")

d. [REDACTED]
[REDACTED] e.”

341. Google’s use of its ad server monopoly power to steer transactions to its ad exchange and ad buying tools is not competition on the merits. As I explained in my Opening Report, UPR constrains publisher choice for demand sources. As such, it prevents competition on the merits for publishers’ inventory. Thus, Google’s implementation of UPR and the effects it had on rival tools consists of harm to competition. Professor Baye omits the constraint on publisher choice and consequently naively concludes that “harm to rivals does not equal harm to competition.”⁵⁸⁶

342. In my Opening Report, I presented evidence that publishers were harmed by UPR. First, I opined that UPR reduced quality of ad serving for publishers.⁵⁸⁷ Among the evidence I shared, an internal Google document that tracked publisher responses to UPR shows [REDACTED]

[REDACTED]
[REDACTED] In a 2019 email, [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED].⁵⁸⁸

343. Google’s UPR also harmed publishers by lowering prices for their inventory on AdX. As I explained in my Opening Report, following the initial roll-out of UPR and the first-price auction in May 2019, the average monthly CPM for [REDACTED] on AdX started declining systematically until October 2019.⁵⁸⁹ Over this period, monthly CPM fell by [REDACTED] % from \$ [REDACTED] in May 2019 to \$ [REDACTED] in October 2019.⁵⁹⁰ At the same time, impressions transacted through AdX rose sharply until October 2019, increasing by around [REDACTED] % from about [REDACTED] to [REDACTED]. The [REDACTED] is not an exception case, nor as Professor Baye claims, do I rely on a “snapshot of data for a single publisher”⁵⁹¹ to conclude that UPR harmed publishers. The evidence I presented in my Opening Report shows that a substantial share of publishers received lower inventory prices via AdX after UPR and the auction format change (combined Unified Auction effect).⁵⁹²

⁵⁸⁶ Baye Report, ¶519.

⁵⁸⁷ Gans Opening Report, Section VII.A.6.

⁵⁸⁸ GOOG-DOJ-09715071 at -072. “Re: Just not cricket” (October 1, 2019). Internal Google email thread discussing the complaint of [REDACTED] with [REDACTED]. (“Out of personal respect for you and in full disclosure, I am going to make a few public comments in coming days re our relationship with Google. My deep disappointment stems from two things: [REDACTED].”)

⁵⁸⁹ Gans Opening Report, ¶522.

⁵⁹⁰ Gans Opening Report, ¶522.

⁵⁹¹ Baye Report, ¶515.

⁵⁹² Gans Opening Report, ¶525 (“As evidenced above, publishers received lower inventory prices via AdX after UPR and the auction format change (combined Unified Auction effect).” See also Figure 19, 20

344. Additionally, in my Opening Report, I demonstrated that the existing evidence of the negative impact of UPR on publisher revenues understates the real effect due to the confounding effect of the move to a first-price auction. Empirical evidence in the academic literature⁵⁹³ is supported by internal documents stating that after the change from SPA to FPA: “[REDACTED]”⁵⁹⁴ Due to insufficient bid shading, advertisers are paying more in the short-term until they adjust to the FPA. In sum, the downturns in inventory price after UPR are understated because of the simultaneous transition to a first-price auction.

345. I also show evidence that Google knew that the first-price auction launch would disguise the negative effects of UPR and chose to implement those two changes together to appear less “self-serving.”⁵⁹⁵ This shows that Google knew it was harming publisher choice, and consequently, competition and took steps to conceal it.

346. Building on my illustration of publisher harm through the [REDACTED] example, Professor Baye further asserts that [REDACTED] revenue in Open Auction increased following the implementation of UPR. First, Professor Baye’s analysis of [REDACTED] Open Auction (AdX) revenue disregards the effect of UPR on competition and, therefore, publishers’ sources of revenue outside of AdX. Second, even looking through the narrow lens of AdX revenue and not accounting for the confounding positive effect on revenue of the switch to the first price auction,⁵⁹⁶ publishers’ revenue in AdX did not increase around the launch of UPR after accounting for the pre-existing trend. In Figure 17 below, I show that, DFP publishers’ AdX revenue did not increase and potentially declined as a result of UPR. Again, this largely understated the publisher’s revenue “but-for” UPR because it is not possible to isolate UPR from the first-price auction launch.

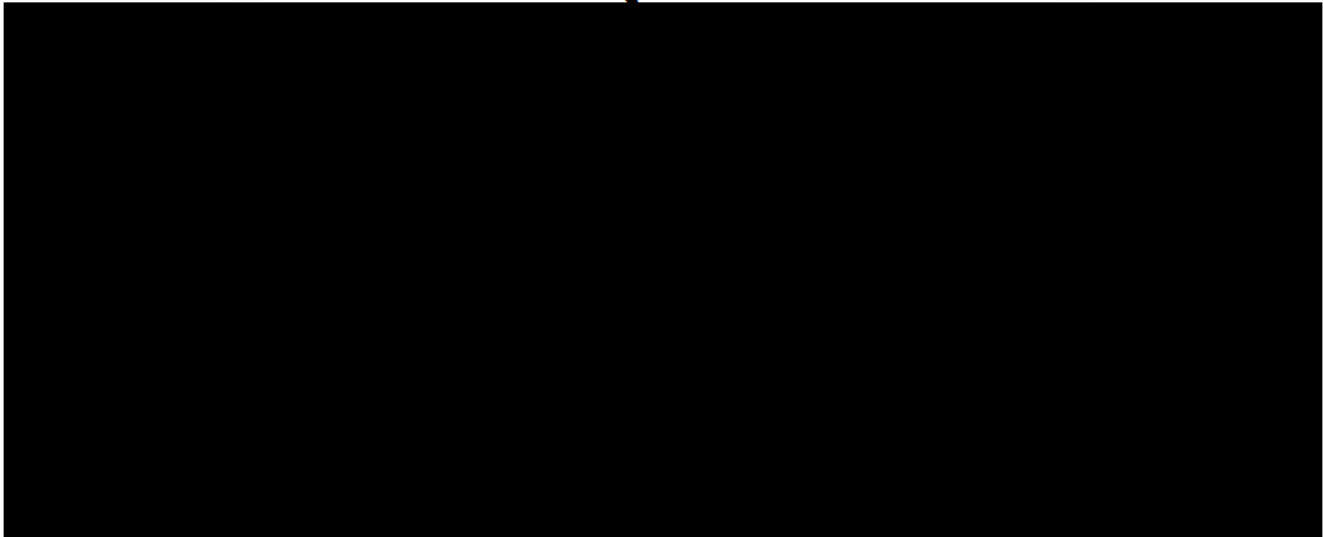
⁵⁹³ See Gans Opening Report, ¶527-532.

⁵⁹⁴ GOOG-TEX-00682264 at -265, “Re: Unified Auction Changes (Sellside) Executive Update” (August 19, 2019). Internal email thread with [REDACTED].

⁵⁹⁵ GOOG-DOJ-AT-00569648 at -648, “Fwd: First-price & Removing pricing knobs” (May 11, 2019). Internal email thread with [REDACTED] and [REDACTED]. (“Doing this [UPR] by itself makes it look extremely self serving.”).

⁵⁹⁶ Gans Opening Report, ¶527-534.

Figure 17



347. Importantly, UPR had a significant negative effect on CPMs via AdX. As seen in the above publisher revenues, this negative price effect is as important as the positive effect on AdX impressions. Contrary to Professor Baye's opinion, the [REDACTED] example in my Opening Report, is not an isolated case.⁵⁹⁸ Figure 18 below shows that CPMs on AdX decreased *overall*, across *all publishers*, around the launch of UPR. The long-term reduction in AdX CPMs is particularly clear for large publishers,⁵⁹⁹ who are more likely to use sophisticated flooring mechanisms and, hence, were the biggest losers from the introduction of UPR. Figure 19 shows the effect of UPR on large publishers' CPM.

⁵⁹⁷ DRX Internal Stats data is used for this analysis. The column "is_mobile_app_request" is filtered to be "False" and the column "is_youtube_inventory" is filtered to be "False." The data is aggregated at the "gfp_network_id" and "month" level, all rows with non-positive "impressions" or negative "publisher_gross_revenue_usd" are excluded. "Revenue" is derived from the column "publisher_gross_revenue_usd." Impressions are via AdX if the column "transaction_type" has values "0" and "4," which represents "Open auction" and "First Look deals" according to the letter Re: In re: Google Digital Advertising Antitrust Litigation, No. 1:21-md-03010 (PKC). The vertical line indicates October 2019. The elevated values observed in November and December 2019 are attributed to seasonality, as similar trends are consistently seen during these months in other years.

⁵⁹⁸ Baye Report, ¶515.

⁵⁹⁹ Also note that the figure shows that this effect persists for at least two years after the introduction of UPR, contrary to Professor Baye's theory that some of the decrease in [REDACTED] CPM I show in my Opening Report may be due to COVID-19.

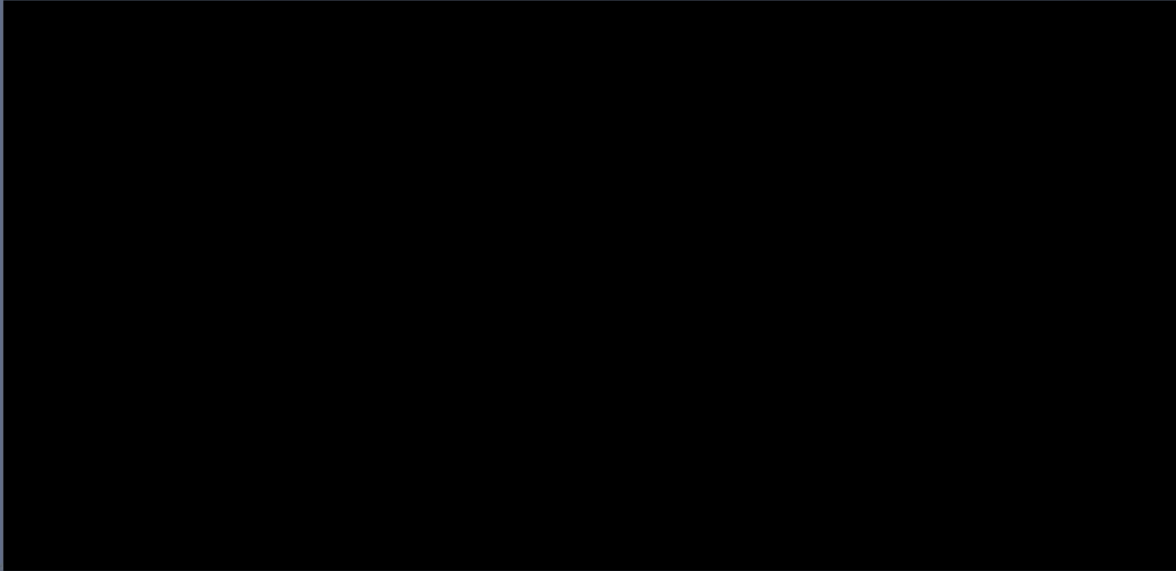
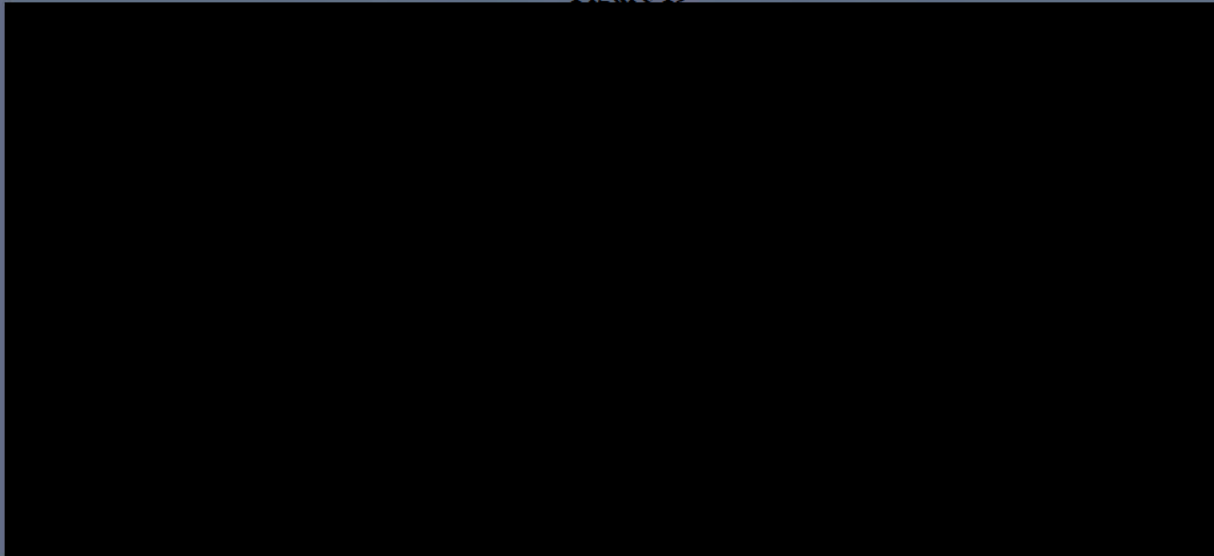


Figure 19



⁶⁰⁰ DRX Internal Stats data is used for this analysis. The column “is_mobile_app_request” is filtered to be “False” and the column “is_youtube_inventory” is filtered to be “False.” The data is aggregated at the “gfp_network_id” and “month” level, all rows with non-positive “impressions” or negative “publisher_gross_revenue_usd” are excluded. CPM is calculated as the ratio of “publisher_gross_revenue_usd” and “matched_impressions” (divided by 1000). Impressions are via AdX if the column “transaction_type” has the value “0” or “4,” which represents “Open auction” and “First Look deals” according to the letter Re: In re: Google Digital Advertising Antitrust Litigation. Outliers are removed. The fitted lines follow a quadratic form, with months corresponding to the UPR ramp-up stage excluded from the fitting process. The vertical line indicates “October 2019,” when UPR was fully launched. The elevated values observed in November and December 2019 are attributed to seasonality, as similar trends are consistently seen during these months in other years.

⁶⁰¹ DRX Internal Stats data is used for this analysis. The column “is_mobile_app_request” is filtered to be “False” and the column “is_youtube_inventory” is filtered to be “False.” The data is aggregated at the “gfp_network_id” and “month” level, all rows with non-positive “impressions” or negative “publisher_gross_revenue_usd” are excluded. CPM is calculated as the ratio of “publisher_gross_revenue_usd” and “matched_impressions” (divided by 1000). Impressions are via AdX if the column “transaction_type” has the value “0” or “4,” which represents “Open auction” and “First Look deals” according to the letter Re: In re: Google Digital Advertising Antitrust Litigation. Outliers are removed. A publisher is large if the column “gfp_product_segment_name” is “PREMIUM” or “PREMIUM_WHITELIST.” The fitted lines follow a quadratic form, with months corresponding to the UPR ramp-up stage excluded from the fitting process. The vertical line indicates “October 2019,”

348. Professor Baye also asserts that there was no market-wide restriction in output stemming from UPR and shows the growth in overall Header Bidding and AdX (including by non-Google Real Time Bidders) impressions transacted to support his opinion.⁶⁰² Looking at overall output expansion in a growing industry is not an appropriate way to analyze anti-competitive effects. Even if it were, Professor Baye omits the fact that Exhibit 28 in his report shows a decline in overall impressions transacted in recent years. Professor Baye's Exhibit 28 shows that DFP impressions reach a historical peak of [REDACTED] monthly impressions at the offset of UPR and, levels decline from late 2020 onwards. This is indicative of the overall market levels as DFP has over a [REDACTED]% market share. In particular, this happened in spite of the momentary spike in transactions during the COVID-19 pandemic.⁶⁰³

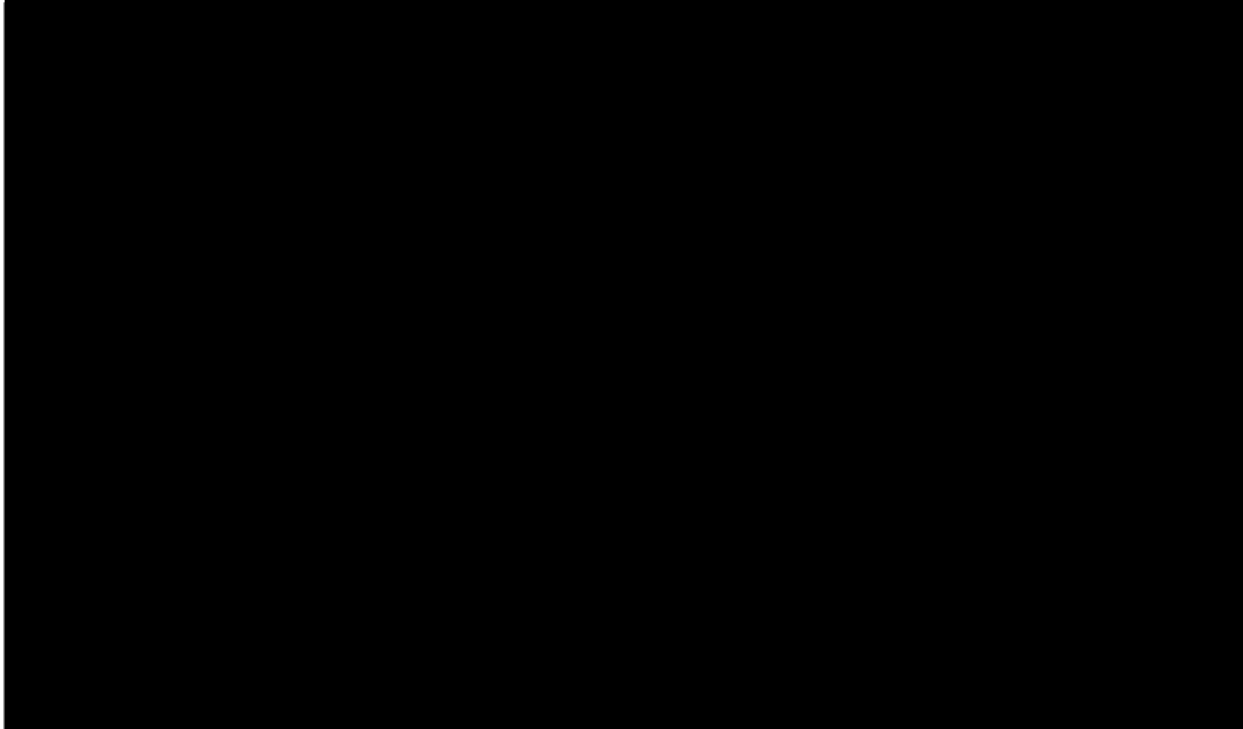
349. Moreover, the introduction of UPR and the move to the unified first-price auction is also associated with a discontinuous increase in AdX's share of all indirect DFP transactions. Figure 20 shows that AdX gained share at the expense of third-party demand sources following the launch in a noticeable way.

when UPR was fully launched. The elevated values observed in November and December 2019 are attributed to seasonality, as similar trends are consistently seen during these months in other years.

⁶⁰² Baye Report, Exhibit 28.

⁶⁰³ Professor Baye claims that my analysis is not reliable because it overlaps with Covid-19 lockdowns. However, this is inconsistent with Professor Baye's own exhibit 28 which shows that Covid actually had a positive effect on volumes. *See* Baye Report, ¶515. ("More broadly, even ignoring the potential benefits of UPR to advertisers, a snapshot of data for a single publisher consisting of less than two years (much of which overlap with the COVID-19 pandemic lockdowns) is an insufficient basis from which to infer broader harm to publishers."); *See* Baye Report, Exhibit 28.

Figure 20



C. Dynamic Allocation and Enhanced Dynamic Allocation

350. Dynamic Allocation (DA) was an auction feature introduced by DoubleClick in 2007, prior to its acquisition by Google, that improved the allocation of publisher impressions (initially remnant impressions) to advertisers, replacing a previous process known as the Waterfall. In his discussion of DA (and its successor, Enhanced Dynamic Allocation), Professor Milgrom extolls the benefits of DA compared to a world without DA. The experts in this case do not dispute that live bids from AdX and real time bidding innovations were clear benefits to publishers. First, these innovations were not unique to Google and do not characterize the relevant aspects of DA which were anti-competitive. As my Opening Report clearly states,⁶⁰⁵ it was Google's configuration choice when it implemented DA and continued to maintain it for a significant period of time, which was anti-competitive. DA was about putting AdX first in line in the

⁶⁰⁴ DRX Internal Stats data is used for this analysis. The column "is_mobile_app_request" is filtered to be "False" and the column "is_youtube_inventory" is filtered to be "False." The data is aggregated at the "gfp_network_id" and "month" level, all rows with non-positive "impressions" or negative "publisher_gross_revenue_usd" are excluded. Revenue is derived from the column "publisher_gross_revenue_usd." According to the letter Re: In re: Google Digital Advertising Antitrust Litigation, impressions are via direct deals if the column "transaction_type" has value "3" or it has value "-1" together with the column "reservation_type_name" being "RESERVATION_SPONSORSHIP" or "RESERVATION_STANDARD." All impressions other than direct deal ones are indirect. Impressions are via AdX if the column "transaction_type" has the value "0" or "4," which represents "Open auction" and "First Look deals." The share is calculated as the ratio between impressions in AdX and all indirect impressions. The vertical line indicates "October 2019," when UPR was fully launched.

⁶⁰⁵ Gans Opening Report, ¶548. ("In its implementation of DA after the acquisition of DoubleClick, Google made and maintained critical choices with the intention of steering inventory to its AdX exchange compared to other intermediaries, without providing benefits to publishers.")

Waterfall, not the advent of RTB, and there was requirement to put AdX as first in line. That is, the appropriate analytical approach is to compare the world with DA as implemented by Google with a world with DA as implemented by an ad server provider who did not have market power nor was vertically integrated into ad exchanges. Therefore, much of the analysis provided by Professors Milgrom and Baye is not relevant in this matter.

351. For example, consider Google's implementation of DA, which did not allow other exchanges to engage in real-time bidding. Professor Milgrom asserts that this was because real-time bidding was implemented when Google upgraded its exchange AdX (to AdX 2.0) in 2009. However, as is not in dispute, publishers wanted to receive real-time bids from other exchanges, which led to the demand and development of Header Bidding (argued by Professor Milgrom to be inferior and more costly)⁶⁰⁶ to achieve just that. By 2014, this was a popular technical implementation of real-time bidding that Professor Milgrom opines was not technically possible for GAM until 2019, when the entire AdX auction system was redesigned.⁶⁰⁷ He opines that this is important historical context. His evaluation of it is not correct. For many years, real-time bidding was, indeed, technically feasible but that Google, precisely because it had market power in ad server tools, was able to delay to support the advantages of having only AdX access to those features in GAM afforded AdX in competition with other exchanges.⁶⁰⁸ With real-time bidding, publishers wanted it, and it was technically feasible, but Google did not provide it.

352. One of the advantages afforded Google in its implementation of DA was a procedure that gave AdX bids an advantage with the effect of a "right of first refusal."⁶⁰⁹ This allowed AdX bids that cleared publisher floors to win impressions without the opportunity for other exchange bids to be considered. It also created incentives for publishers to distort those floors higher as a result.⁶¹⁰ Whether those floors were set optimally, however, would depend both on a publisher's sophistication and on the information they had available. In his analysis of DA, Professor Milgrom assumes that publishers could adjust floors optimally,⁶¹¹ but I note here that just because publishers may have adjusted floors, it is far from clear that they published optimally.

⁶⁰⁶ Milgrom Report, ¶477-479.

⁶⁰⁷ Milgrom Report, 263(b).

⁶⁰⁸ Gans Opening Report, ¶578-583.

⁶⁰⁹ In my Opening Report, I referred to this as a "right of first refusal" (*see* Gans Opening Report, ¶548) creating confusion with the legal definition of such a term as it might appear in a contract. This was not my intention. Instead, I was looking at the effect of implementation that gave an AdX bidder the opportunity to win an impression by clearing the value CPM chosen by the publisher. As I went on to say immediately after "This meant that AdX was offered the opportunity to submit a live bid on each impression, if AdX did not win the impression, only then was it offered to third-party exchanges in the Waterfall." (*see* Gans Opening Report, ¶548).

⁶¹⁰ Milgrom Report, ¶303.

⁶¹¹ Milgrom Report, ¶305.

353. In my Opening Report, I used an example to demonstrate this.⁶¹² Unfortunately, that example contained a typo that subverted the message of the example.⁶¹³ Therefore, let me restate my example as corrected. The example showed that publishers may incur losses due to AdX being prioritized in DA, even in cases where other exchanges offer higher bids than AdX. For instance, a publisher may set a CPM rate of \$3 on AdX and \$4 on other exchanges due to historical performance.⁶¹⁴ Suppose the highest bid on AdX is \$4, whereas an alternative exchange has a unique demand source who bids \$6 for the same impression. Because the AdX bid of \$4 exceeds the publisher's CPM rate, AdX will serve the impression rather than pass through that impression to the alternative source with a higher bid. Thus, the publisher receives revenue of \$4 rather than \$6 as a result of AdX having a first refusal priority. Professor Milgrom⁶¹⁵ opines that publishers would set a CPM rate for other exchanges higher than in my example. However, as I emphasize, this requires an assumption that publishers can optimize in that manner.

354. More realistically, publishers do not have the requisite information to make the fine-tuned adjustments necessary.⁶¹⁶ By contrast, the advantage of having a level playing field when considering bids is that the publisher does not have to be sophisticated nor invest in ways of becoming more sophisticated to achieve maximal returns. If the ad server market were competitive, suppliers would have an incentive to make floor prices and other inventory management adjustments easier for all publishers. By contrast, publishers are forced to play a game against Google by adjusting their price floors for AdX and other exchanges to compensate for AdX's priority advantages. This is not an outcome economists would expect from efficient market design.

355. Professor Milgrom also opines that I asserted that Enhanced Dynamic Allocation offered AdX "exclusive access to a new pool of publisher inventory."⁶¹⁷ While I explicitly acknowledge how non-guaranteed line items compete for direct deals, I explain that, in spite of this, AdX still maintains an advantage with respect to guaranteed line items.⁶¹⁸ Further, the very document Professor Milgrom uses to

⁶¹² Gans Opening Report, ¶575.

⁶¹³ Milgrom Report, ¶307.

⁶¹⁴ Note that in my Opening Report, the publishers' CPM rate was listed as \$5, which created the subsequent issue. Professor Milgrom is correct that if the alternative CPM was \$5, then the AdX bid of \$4 would not clear that and the impression would be passed through. However, as is now shown, if the publisher CPM rate was for the alternative exchange was \$4 or less, the publisher would be worse off than a situation where the bids of all exchanges could be evaluated simultaneously.

⁶¹⁵ Milgrom Report, ¶307.

⁶¹⁶ See also Deposition of [REDACTED] (Former Tech Lead Manager, Google), 113:2-113:4, May 23, 2024. ("With per buyer, that's getting inside the mechanism of the auction itself. And a publisher can't do that on their own.")

⁶¹⁷ Milgrom Report, ¶321.

⁶¹⁸ Gans Opening Report, ¶628, ¶630. ("As I explained above, EDA enables AdX (and only AdX) to transact impressions that would have been allocated to direct deals if it results in a higher clearing price. More specifically, AdX was given the ability to use the highest valued line item price as its reserve price, and transact the impression if it can beat this reserve price. No other exchange has this ability. AdX's privilege under EDA hams the competition in the ad exchange market in the long run.")

support the claim that non-guaranteed line items can compete for that inventory explains that this competition was not effectively happening because Header Bidders were frequently throttled.⁶¹⁹

356. In Professor Milgrom's Theorem 2, he assumes that "publishers' guaranteed contracts are unchanged after the introduction of EDA."⁶²⁰ Professor Milgrom provides no proof this is true, and, the fact that this assumption does not hold is the basis of the cream-skimming theory I put forth. In paragraph 632 of my Opening Report, I opine that "[i]n the long run, AdX's unique ability to trade high-value impressions makes it more appealing to advertisers compared to other exchanges. Without EDA, advertisers need to purchase high-value line items in bulk via direct deals, meaning they have to make commitments to buy high-value impressions at a large scale. [...] Since DFP gives AdX a right of first refusal to trade high-value impressions, EDA gave AdX an advantage."

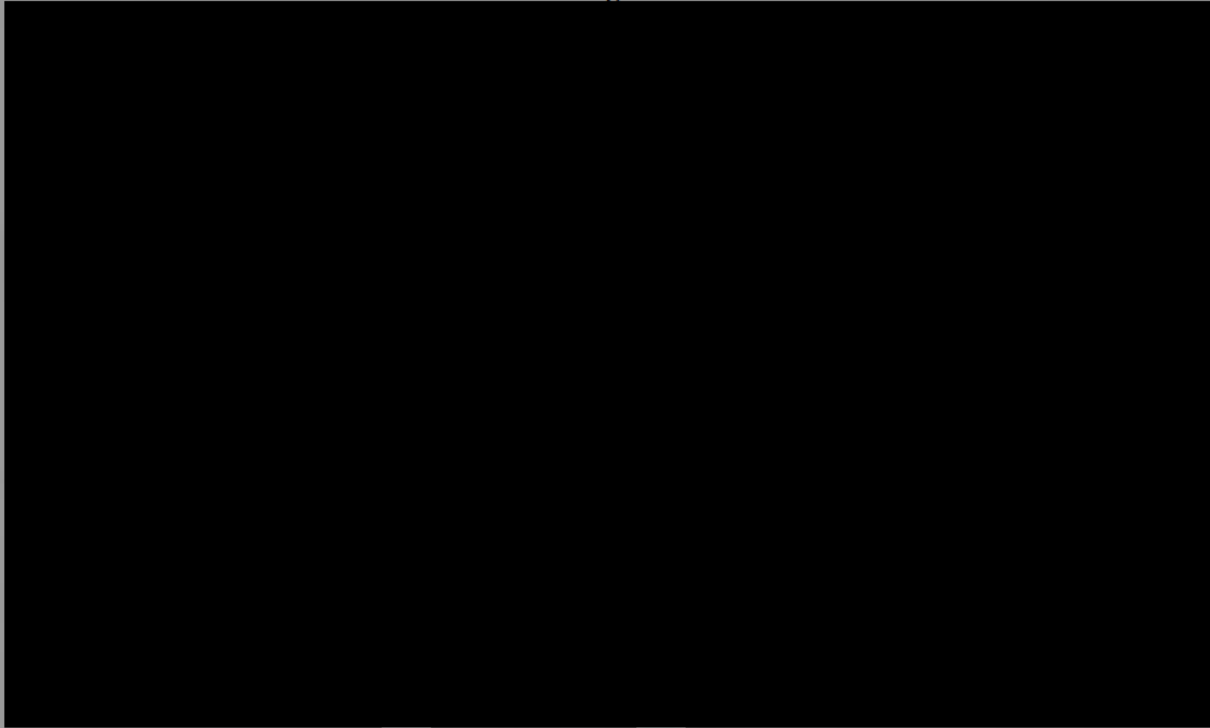
357. The key prediction of the cream-skimming theory I put forth is that the value of direct deals will fall over time. This is consistent with the evidence I present in Figure 21 below. Professor Milgrom does not account for this evidence, which is the correct test for the theory I presented. Instead, Professor Milgrom performed an empirical analysis of one week of Google data from 2022, which compares the quality, measured via Click-Through-Rates (CTRs), of the impressions that EDA allocated to guaranteed contracts to the quality of all impressions that satisfied the contract terms.⁶²¹ Professor Milgrom's analysis is not an appropriate test of the effect of EDA, which is to deteriorate the quality of impressions allocated and, consequently, the value of guaranteed deals *over time*. Professor Milgrom's analysis only serves to show that all impressions satisfying the guaranteed contract terms, both those that EDA allocated to those contracts and the ones that EDA did not, had depressed prices. As shown in Figure 21, CTRs for guaranteed deals have decreased since the launch of EDA and have done so substantially in comparison with the CTR of impressions allocated to Open Auction (AdX).

⁶¹⁹ GOOG-DOJ-AT-02423786 at -787. "Uniform Treatment for DFP Remnant and AdX under EDA" (April 2019). Internal design document for EDA. ("Another example is that one of our premium publishers, [REDACTED], had questioned about their super high-value remnant line items (header bidding) often getting rejected even when its CPM is a lot higher than the EDA price, and [REDACTED] had to make a special case change for them to ensure their high-value remnant ads can serve as desired.")

⁶²⁰ Milgrom Report, ¶328.

⁶²¹ Milgrom Report, ¶328.

Figure 21



358. Professor Milgrom also assumes that “Google accurately forecasts the distribution of future bids from AdX,”⁶²³ but he admits, “[o]ne important detail arises because the bids that arrive over time can be forecast only imperfectly, so to ensure that all guaranteed contracts are fulfilled, AdX needed to track the rate at which guaranteed contracts were being served and update the EDA price adaptively.”^{624,625} Professor Milgrom recognizes in these statements the informational advantage that AdX has in performing this calculation by virtue of being tied to DFP. Publishers do not get similar data to perform the kind of optimization and counter-acting of Google conduct that Professor Milgrom argues publishers should make use of.

D. Line Items, Header Bidding and the Last Look Advantage

359. In my Opening Report, I observed that Google engaged in a set of active strategies to counter the competitive threat to their ad tech stack that came from Header Bidding. Some of these strategies, including

⁶²² Source: DRX Internal Stats. Data represent the sum of clicks divided by the sum of matched impressions by reservation type and month.

⁶²³ Milgrom Report, ¶328.

⁶²⁴ See Google, “DFP and dynamic allocation,” DoubleClick for Publishers Help (captured on Sep. 22, 2015) at https://web.archive.org/web/20150922150140/https://support.google.com/dfp_premium/answer/3447903 (“The lower a line item’s Satisfaction Index (SI) (that is, the more behind schedule it is), the higher the temporary CPM that’s passed to Ad Exchange. Therefore, a standard line item that is behind schedule will win often enough to stay on pace to satisfy its goal and pacing settings.”).

⁶²⁵ Milgrom Report, ¶326.

features of Exchange Bidding that replicated the functionality of Header Bidding, were pro-competitive responses. Others, notably line item caps and data redactions were choices that Google made that were anti-competitive because they were based on Google's market power in ad servers and its vertically integrated status into ad exchanges. As I noted, these subverted natural competitive processes and likely increased barriers to entry across various markets.

360. Professors Baye and Milgrom criticize my findings. Professor Baye⁶²⁶ opines that the conduct of Google only impacted a few publishers (although he does not consider the relative scale of those publishers in supplying ad inventory) and goes on to state that, therefore, the conduct was inconsequential. Professor Milgrom reasons similarly although with a more formal theoretical model. Here, I respond to these criticisms and note that they do not change the conclusions I reached regarding this conduct in my initial statement.

1. Last look was a choice by Google and negatively impacted publisher choice and competition in the ad exchange market

361. When publishers used Header Bidding in conjunction with Google's ad server, it had to be set up as a remnant line item. In my Opening Report, I discuss how publishers had to set up line items in Google's ad server to correspond with the value of the winning header bidding bid. Specifically, I used the example that "if a publisher receives a bid of \$5.20 from an exchange using Header Bidding, but the publisher only has a pre-existing line item with a price of \$5, then Google's ad server would round down the Header Bidding bid to the line item with the next closest price (in this case, \$5)"⁶²⁷ Professor Milgrom misinterprets my example to mean that Header Bidding line items would always be rounded down to the closest pre-existing line item in DFP.⁶²⁸ My example only describes a hypothetical scenario where the pre-existing line item is lower than the actual Header Bidding bid value, in which case the bid would be rounded down. Additionally, Professor Milgrom asserts that while the Header Bidding bid in my example is associated with a lower value CPM line item in DFP, the payout to the publisher, should that line item be served, would be the actual bid amount, not the line item value CPM.⁶²⁹ However, Professor Milgrom neglects to mention that the value CPM associated with the line item, not the actual bid value, is a factor in determining the floor price shared with AdX via Dynamic Allocation. Thus, if publishers cannot create line items at the level of granularity required to reflect the range of potential Header Bidding bid prices, Dynamic Allocation

⁶²⁶ Baye Report, ¶567.

⁶²⁷ Gans Opening Report, ¶661.

⁶²⁸ Milgrom Report, ¶383.

⁶²⁹ Milgrom Report, ¶383.

will misrepresent the price floor to beat AdX, which can lead to a lower value line item winning the auction over the Header Bidding line item.

362. Due to the way Google configured its ad server tools, AdX (Google's exchange) was given a "last look" at the publisher CPM, giving it the opportunity to supply a higher bid that would be used as a floor in the AdX auction. The conduct in question was Google's choice in configuring its ad server tools to give AdX that last look rather than allowing publishers to select the ad exchange that may be given that last look. In other words, there was no technical reason for this choice, but Google was incentivized to make its own exchange a priority. It was precisely because Google had monopoly power in the ad server market that publishers lacked workarounds that would represent competition on the merits.⁶³⁰

363. In response to that allegation, Professor Milgrom opines that publishers could have engaged in other workarounds or countermeasures to mitigate the advantages that Google was providing itself⁶³¹. Professor Milgrom advocates that publishers take action to inflate the floors provided to AdX, a tactic that Professor Milgrom acknowledges elsewhere involves some risk for the publisher.⁶³² As I have noted above, this represents a distortion that Google is forcing on publishers by its choices. Professor Milgrom's Theorem 3 demonstrates that it is only when publishers can costlessly optimize in the face of Google's gaming that the auction outcomes replicate a sensible non-last-look auction design. When they cannot do so, publisher revenue is likely not maximized when last look and its incentive distortions are present.

364. Had Google allowed more flexible configurations in its ad server tools – something it would have an incentive to do if it did not have market power in ad exchanges – publishers would not face distorted incentives and take those actions. Even Professor Milgrom cites multiple instances where Google employees admit that there were considerable incentives for publishers to inflate bids to put price pressure on AdX and DFP.⁶³³ The documents also state that these incentives were detrimental to publishers.⁶³⁴

365. Professor Milgrom also makes the claim that Last Look behaves like other competitor programs.⁶³⁵ Specifically, he cites OpenX as passing Header Bidding bids as price floors for subsequent auctions.⁶³⁶

⁶³⁰ Professor Milgrom (*see* Milgrom report, ¶386 and ¶387) provides additional ways in which Google could have removed a last look advantage that may have been possible by changes to the way ad server tools operated. The existence of these alternatives only enhances my claim that Google made choices that gave AdX a last look when it could have configured its ad server tools differently.

⁶³¹ Milgrom Report, ¶354b.

⁶³² Milgrom Report, ¶391.

⁶³³ Milgrom Report, footnote 669.

⁶³⁴ GOOG-NE-09709810 at -812. ("Unified Auction Changes (Sellside) Executive Update – Aug 12, 2019" (August 13, 2019). ("Additionally, there is a long-term benefit of publishers having reduced incentives to inflate the CPMs of Header bidding line items.").

⁶³⁵ Milgrom Report, Section X.

⁶³⁶ Milgrom Report ¶353.

However, the selling rules Professor Milgrom cites as support for OpenX's ad server configuration fail to explicitly state how Header Bidding inventory integrates as a line item in OpenX.^{637,638} Thus, Professor Milgrom cannot support his conclusion that OpenX operated a similar Last Look program as Google.

366. Professor Milgrom ignores the long-term effects of DRS and Last Look on Header Bidding wins. As stated in my Opening Report,⁶³⁹ "[t]he combined effects of Last Look and DRS v2 led to revenue losses for the publishers for the following reasons. When DRS v2 led to a decrease in the take rate to clear a binding price floor generated by Last Look, which is equal to the Header Bidding winning bid, the impression is awarded to AdX;⁶⁴⁰ the publisher gets paid only 1 cent higher than the Header Bidding winning bid.⁶⁴¹ However, the debt account associated with that publisher turns negative, which might be substantially larger than 1 cent depending on the size of the dynamic take rate adjustment. This means that the publisher will have to pay that amount back to Google in other auctions through dynamic take rate increases as a part of DRS v2 balancing its debt account for that publisher. Had this not been the case, the publisher would be getting the Header Bidding winning bid, which is only 1 cent lower than what the AdX bid would have been but would not lose out on potentially substantial revenue in the future due to DRS v2 balancing its account."

2. Line item caps were unnecessary for cost efficiency and subverted Header Bidding

367. Line items are set up by publishers to integrate Header Bidding bids into DFP. Publishers must set up line items to correspond to the potential range of winning bids that come in through Header Bidding. For example, in July 2017 the [REDACTED] had over [REDACTED] active line items. Of those, the PreBid line

⁶³⁷ Milgrom Report ¶359.

⁶³⁸ Professor Milgrom cites the OpenX Selling Rules as evidence that OpenX "integrated header bidding in a similar way to publishers using GAM: OpenX bidders competed *after* third-party remnant demand, with header bids determining floor prices." However, the evidence Professor Milgrom cites does not support that conclusion. OpenX, "Selling Rules" (Dec. 12, 2016), https://web.archive.org/web/20170708051049/https://docs.openx.com/Content/publishers/userguide_inventory_realtimeselling.html ("If enabled, you can designate inventory to sell through OpenX Ad Exchange using selling rules [...] When OpenX receives an ad request for inventory defined by a selling rule, it proceeds with the selection process and selects an eligible line item for the ad space. If the selected line item is for non-guaranteed delivery, before serving the ad for the selected line item, OpenX will give buyers in the real-time bidding exchange the opportunity to bid on the ad space. If a bid is higher than the selected line item, and it matches or exceeds the floor price set for the selling rule, then OpenX serves the ad of the winning bidder, rather than the ad for the line item originally selected by the ad server.")

⁶³⁹ Gans Opening Report, ¶809.

⁶⁴⁰ GOOG-TEX-00843142 at -145. "First-price bidding Update" (September 3, 2019). Internal Google presentation. ("The header bidders are called first and a first-price auction is run amongst them. This is sent as a floor to AdX.")

⁶⁴¹ GOOG-AT-MDL-013987096 at -102. "Publisher Monetization 101" (March 29, 2023). Internal Google presentation. An example is presented to describe the process of "last look." ("AdX's integration into DFP allows it to bid 0.01\$ more than the next highest source of demand")

items made up [REDACTED] active line item, and Google believed the same set up was occurring across other Header Bidding partners.⁶⁴²

368. Google announced that publishers would be limited to 61,000 active line items. Publisher account managers worked with publishers who exceeded the limit to identify ways to get back within the limit. There was a process to request line item limit increases, demonstrating the limit was an artificial restriction. As described by [REDACTED], Engineering Director and a Lead of the Google Ad Manager team at Google, DFP could support additional active line items above 61,000 given “it’s only compute resources, after all.”⁶⁴³

369. According to [REDACTED], line item restrictions would also cause more publishers and demand sources to utilize Exchange Bidding rather than Header Bidding.⁶⁴⁴ Additionally, according to an internal email discussion on the [REDACTED] request for active line item increase, Aparna Pappu, Vice President of Engineering at Google, denied the request stating “Nope – definitely do not want to increase line item limits ...it perpetuates HB when in fact we have a viable alternative as a product.”⁶⁴⁵

370. Professors Baye and Milgrom argue that line items were capped because it was costly for Google to expand them.⁶⁴⁶ However, the document used by Professor Baye to support his claim also shows that there were only [REDACTED] publishers with over 61,000 line items, and reducing their line items would only have a limited impact on costs,⁶⁴⁷ and that Google could also mitigate any cost increase by adapting its pricing,

⁶⁴² DM_GOOG_0000050 at -054, -056. “Re: [Action required] Reduce the number of your active line items in your DFP account.” (July 11, 2017). Google Email to [REDACTED] on requiring a reduction in number of active line items with [REDACTED]

⁶⁴³ GOOG-DOJ-32022633 at -633.” Re: FORK: ALI thread for [REDACTED] with [REDACTED]” (October 9, 2019). Internal Google email thread on an increase request for active line items for [REDACTED]

⁶⁴⁴ GOOG-TEX-00090969 at -969. “Re: Ultraprio – Increase the ALI for [REDACTED]. Internal Google email thread on an increase request for line items for active line items for [REDACTED] with [REDACTED]

⁶⁴⁵ GOOG-TEX-00084837 at -837 “Re: Potentially raising LI limits for [REDACTED]” (December 13, 2017). Internal Google email thread on an increase request for line items for [REDACTED] with [REDACTED]

⁶⁴⁶ Baye Report, ¶564; Milgrom Report, ¶378.

⁶⁴⁷ GOOG-DOJ-06875572 at -574. “PRD/Strate review: Network health” (Undated). Internal presentation discussing increase in line items. (“Only [REDACTED] publishers have more than 61K ALI. Reducing to 61K probably won’t reduce overall size much.”)

or “not making money on a pub for strategic reason” since it was “not a lot of money.”⁶⁴⁸ While Google acknowledged that these were all options to solve this new industry trend, I showed in my Opening Report that Google regularly denied publishers’ requests for exceptions to allow increases in line items.⁶⁴⁹ Google’s limits on line items were “unethical – because [Google was] forcing out competition (no matter the good intentions and the reasonable impact on system stability) at the end of the day [Google was] forcing them to change their business strategy kicking out HBs.”⁶⁵⁰ I note that even if there were such costs, Google, given its monopoly power and integration, would not have an incentive to make an optimal trade-off. Professor Milgrom, as he consistently does throughout his analysis, fails to consider Google’s broad multi-market incentives in making these decisions. What is at the heart of this is the evidence regarding Google’s intent. The analysis in my initial report demonstrated that Google had incentives to cap line items even if it was costless to expand them, which is consistent with the hypothesis that Google’s choices were an abuse of its monopoly power.

371. Professor Baye opines that Google’s line item conduct was not anti-competitive because few publishers used line items and those who did, did not actually need to use that many line items. For those, Professor Baye states that Google’s conduct was “a mild inconvenience.”⁶⁵¹ However, opinions that Google is a benevolent monopolist are not a justification. Even if only some publishers were experiencing a “mild inconvenience,” Professor Baye does not explain how this did not foreclose header bidding from accessing the larger publishers’ impressions.

372. Professor Baye also claims that Google granted the vast majority of line item exceptions for large publishers.⁶⁵² However, as described in my Opening Report, there are many instances where it did not, including denying requests from [REDACTED],⁶⁵³ [REDACTED],⁶⁵⁴ and the [REDACTED].⁶⁵⁵ However, Professor Baye also mentions that Google made exceptions when the publisher was “strategic” and it made the most “economic

⁶⁴⁸ GOOG-NE-06872310 at -321. “PRD/Strate review: Network health” (Undated). Internal presentation discussing increase in line items. (“We recommend adding a not advertised rate-cards. [...] Pricing may not remove all sensitivity from the conversation but it provides an important option for reaching an optimal solution for all parties AND helps publishers understand the cost to us of their decisions.”)

⁶⁴⁹ Gans Opening Report, Section VII.C.3. and ¶652-54.

⁶⁵⁰ GOOG-DOJ-32022633 at -637. “Re: FORK: ALI thread for [REDACTED]” (October 8, 2018). Internal Google email thread on an increase request for active line items for [REDACTED] with [REDACTED].

⁶⁵¹ Baye Report, ¶569.

⁶⁵² Baye Report, ¶568.

⁶⁵³ Gans Opening Report, ¶666. (“Despite acknowledging that Google’s restriction on line items will harm CBS’ yield and stating that it could technically accommodate this request, Google decided not to grant CBS the request, as a big decision to limit CBS expansion of Header Bidding”)

⁶⁵⁴ Gans Opening Report, ¶668. (“Google acknowledged that [REDACTED]’s issue was due to line item restrictions, which were unknown to the publisher and aimed at “protecting” Google’s serving stack.”)

⁶⁵⁵ Gans Opening Report, ¶669. (“In 2017, Google also denied the [REDACTED] a [REDACTED] line item increase”)

sense.”⁶⁵⁶ This indicates that only when it came to the most valuable publisher inventory, was Google willing to make line item exceptions to control demand access to inventory and, in turn, set the terms of access for Google demand and third-party demand sources.

373. Professor Baye claims that I failed to conduct data analyses to show the impact of line item restrictions on Header Bidding adoption and publisher yield.⁶⁵⁷ He opines that line item restrictions were not harmful as header bidding continued to be popular among publishers. Professor Baye fails to tell us how Header Bidding would have expanded absent Google’s conduct. I relied on internal Google documents in my first report to show that both publishers and Google employees acknowledged that publishers would have increasingly used header bidding and would have been better off in a but-for world with a larger number of line items.⁶⁵⁸ I note that Professor Baye himself does not conduct any data analysis. The only quantitative support he provides is an analysis of the volume of Header Bidding impressions transacted. Professor Baye claims that his volume [REDACTED] between 2019 and 2022. Again, Professor Baye does not take into account the but-for world in which publishers would not have been restricted in their increased implementation, which demonstrates that Google’s conduct was anti-competitive. I showed previously that this opinion of Professor Baye was wrong.

E. Data redactions

374. Professor Baye opines that Google’s data redaction conduct was not anti-competitive. His main claim is that Google included additional data fields to “make up for the reduced usefulness.”⁶⁵⁹ However, he does not explain how these additional fields provide more helpful information to publishers to make up for the redacted data. These additional data fields don’t give publishers an understanding of advertisers’ willingness to pay.

375. Professor Baye claims that my “conclusion of anti-competitive harm is premised only on publishers’ inability to link this new information with other information to which publishers already had (and continue to have) access.”⁶⁶⁰ Professor Baye is right. The Google conduct here is the breaking of interoperability between two data sets that provided publishers with great value. Here again, Professor Baye fails to consider a but-for world in which publishers could easily understand advertisers’ willingness to pay. While he explains that publishers could use the data given by Google in a useful way, he fails to compare

⁶⁵⁶ Baye Report, ¶568, Footnote 1043.

⁶⁵⁷ Baye Report, ¶555.

⁶⁵⁸ Gans Opening Report, Section VII.C.

⁶⁵⁹ Baye Report, ¶578.

⁶⁶⁰ Baye Report, ¶581.

it to a world in which publishers could extract even more value from data and thus more easily optimize their yield.

376. Here again, the data available does not enable a quantitative assessment of Google's conduct. Professor Baye repeats the same error by failing to compare the growth of header bidding to other exchanges. Professor Baye does not take into account the but-for world in which publishers would not have been restricted in the performance comparison across exchanges.

377. Professor Baye claims that data redactions are the result of "Google balancing across all sides of the multi-sided platform it operates,"⁶⁶¹ which is consistent with Google's conflict of interest. Professor Baye claims that "platforms function by creating and enforcing rules on all users, regardless of which side of the platform they transact from."⁶⁶² However, the conduct discussed here takes place in the ad server -- not in the ad exchange. An ad server should serve the best interest of publishers; an ad buying tool should serve the best interest of advertisers; an exchange should serve the best interest of both publishers and advertisers. Without vertical integration and monopoly power across the ad tech stack, Google would have no incentive to prioritize the interests of advertisers over those of publishers.

378. Professor Milgrom opines that data redactions were a response to the "historical context of changes in data-sharing policies."⁶⁶³ However, Professor Milgrom does not challenge my interpretation of Google's motive for introducing data redactions, considering what would arise in a competitive market.⁶⁶⁴

379. Additionally, according to industry observers, it is the responsibility of the publisher, not the ad server, "to comply with data protection rules (by, e.g., obtaining appropriate user consent) when collecting user data and associating it with bidding data."⁶⁶⁵ Publishers collect user data from ad requests to store on the publisher ad server. "Such data may then be accessed in the impression-level Data Transfer file, where they are associated with multiple fields, including the price at which the impression was sold, the operating system ID of the user, etc. It is not clear why associating user data with the bidding data represents any additional 'invasion' of privacy."⁶⁶⁶

⁶⁶¹ Baye Report, ¶574.

⁶⁶² Baye Report, ¶589.

⁶⁶³ Milgrom Report, ¶475.

⁶⁶⁴ Milgrom Report, ¶513.

⁶⁶⁵ GOOG-AT-MDL-016886793 at -827. "Trust me, I'm fair: Analyzing Google's latest practices in ad tech from the perspective of EU competition law" (October 7, 2019). TILEC discussion paper no. DP 2019-029 addressing whether Google's switch to a unified auction has addressed concerns.

⁶⁶⁶ GOOG-AT-MDL-016886793 at -827. "Trust me, I'm fair: Analysing Google's latest practices in ad tech from the perspective of EU competition law" (October 7, 2019). TILEC discussion paper no. DP 2019-029 addressing whether Google's switch to a unified auction has addressed concerns.

F. Auction Manipulations

380. In his expert report, Professor Milgrom provides an evaluation of the Google conduct that I analyzed under the category of “auction manipulations” in my Opening Report. Professor Milgrom does not tether his analysis to a relevant market and market power. He merely argues that each of these conducts was efficiency-enhancing,⁶⁶⁷ not detrimental to advertisers or publishers,⁶⁶⁸ or reflected “competition on the merits.”⁶⁶⁹

381. Professor Milgrom makes several assertions against Plaintiff Experts’ (myself included) have analyzed these conducts.

382. First, Professor Milgrom opines that the Plaintiff Experts underappreciate the sophistication of advertisers and publishers as they participate in auctions. Second, building on his first point, Professor Milgrom asserts that the Plaintiff Experts did not sufficiently consider the incentives of advertisers and publishers as they participate in those auctions to take actions that counter the constraints placed on them by Google’s conduct affecting auction rules. Third, Professor Milgrom opines that the Plaintiff Experts, in constructing counterfactuals include choices that would not be possible given the historical context in which they might have been made. In what follows, I demonstrate that each of these criticisms does not stand up to scrutiny.

383. Professor Milgrom himself selectively applies his presumption of sophisticated advertisers and publishers, varying it according to the conduct he is analyzing. For example, Google kept various practices secret such as Bernanke and DRS, but Professor Milgrom argues that advertisers were sophisticated enough to work around that secrecy (although there is no evidence of that actually occurring in the way Professor Milgrom described).⁶⁷⁰ In my Opening Report, I noted that market participants (specifically, publishers) realized that something odd was going on. But, at the same time, Professor Milgrom extolls the benefits of providing tools and auction design with the aim of reducing the need for participants to engage in guessing and related behaviors; e.g., by offering tools for experiments⁶⁷¹ providing auction designs that allow participants to simply bid their values⁶⁷² aiming for bidder truthful auctions that were “faster, less costly,

⁶⁶⁷ For instance, Professor Milgrom opined “Enhanced Dynamic Allocation (EDA) was a Google program to increase publishers’ revenues and improve efficiency by allowing real-time bids to compete for impressions that, without EDA, would be allocated to guaranteed contracts.” See Milgrom Report, ¶318.

⁶⁶⁸ For instance, Professor Milgrom opined “UPR benefited Google’s buyer-customers.” See Milgrom Report, ¶521.

⁶⁶⁹ For instance, Professor Milgrom opined “After analyzing the Google practices listed in Paragraph 12, I find instead that these practices represent competition on the merits, providing benefits to Google’s customers: its advertisers, publishers, or both.” See Milgrom Report, ¶14.

⁶⁷⁰ Milgrom Report, ¶417; Milgrom Report, ¶173.

⁶⁷¹ Milgrom Report, ¶33.

⁶⁷² Milgrom Report, ¶61.

and more fair to the less sophisticated advertisers”⁶⁷³ or choosing rules to reduce multi-calling that “destroys the simplicity of threshold pricing and so complicates bidding for advertisers, forcing them to strategize about how best to respond to the publisher’s practice and make guesses about the publisher’s true floor price and about others’ bids.”⁶⁷⁴ Thus, on the one hand, Professor Milgrom claims advertisers are sophisticated enough to discern Google’s secret tactics while, on the other, they are not sophisticated enough to deal with the tactics of other market participants.⁶⁷⁵

384. I consider not only the incentives of advertisers and publishers but also the costs, often imposed on them by Google, that constrain their ability to action those incentives. Moreover, I consider the incentives of providers in the various markets—notably Google—in order to form a proper equilibrium analysis of the conduct and its impact on competitive outcomes across each market and not simply for Google’s direct customers. Even Professor Milgrom recognized that it is an important virtue of auction design to ensure that “no auctioneer can profit from deceiving a bidder about the correct price: the winning bidder can easily check whether its payment equals its bid.”⁶⁷⁶

385. In constructing counterfactuals, I have remained mindful of the choices that Google could have made and do not regard it as a faint accompli that just because a choice was not available at a particular historical moment, it could not have been made subsequently. In other words, historical context is something that I considered but did not, as the evidence showed, conclude that it was constraining Google’s subsequent choices.

386. In what follows, I examine Professor Milgrom’s criticisms and respond to them in the manner just outlined.

1. Project Bernanke

387. Project Bernanke was a procedure that was implemented within Google’s buy-side tools to advertisers that altered the bids submitted on behalf of those advertisers into Google’s own AdX auction. The AdX auction was a second-price auction and GDN would submit two bids to that auction for an impression on behalf of advertisers. In some circumstances, therefore, the lower bid set the price that the GDN advertiser would pay for the impression (including GDN’s take rate, set at █% per impression transacted prior to Bernanke). In other circumstances, the higher bid would be less than bids from non-

⁶⁷³ Milgrom Report, ¶65.

⁶⁷⁴ Milgrom Report, ¶77.

⁶⁷⁵ Chandler Rebuttal Report, ¶ 71; *See also* Deposition of Kimberley Burchett (Former Tech Lead Manager, Google), 113:2-113:4, May 23, 2024. (“With per buyer, that’s getting inside the mechanism of the auction itself. And a publisher can’t do that on their own.”)

⁶⁷⁶ Milgrom Report, ¶81.

GDN sources or publisher floors. In this case, GDN's take rate may be preventing GDN from winning that auction. Project Bernanke altered the bids being submitted to the AdX auction – lowering GDN's take rate on impressions it might lose as a means of increasing the actual bid submitted to AdX and making up for that by increasing GDN's take rate on impressions that were not competitive effectively lowering the actual bid submitted to AdX. Google fine-tuned this strategy so that “in expectation” or “on average” received a [REDACTED] percent take rate on impressions. For Project Bernanke, this average was at the publisher level, while for Global Bernanke, it was across all GDN impressions.

388. Note that this is the description I provided of Bernanke in my Opening Report. Professor Rinard interpreted this description to mean that I described Bernanke as occurring within AdX and not in GDN.⁶⁷⁷ I am well aware that Bernanke takes place in GDN and not AdX, as it is clear from my Opening Report.⁶⁷⁸ The fact that Bernanke occurs in GDN is consistent with my assessment that Bernanke is an auction manipulation program. Bernanke is a manipulation of the GDN auction occurring before the AdX auction. Due to Google's monopoly power in the market for ad buying tools for small advertisers, Bernanke also impacts the outcome of the AdX auction. Bernanke's bid manipulation increases GDN's win rate, Google's ad buying tool effectively bidding exclusively on AdX. As such, it harms ad exchange competition as well.

389. Bernanke was not a procedure that was visible to the market. As I discuss in my Opening Report, Google actively concealed its existence from both publishers and advertisers.⁶⁷⁹ Professor Milgrom asserts that it is common-place for bidders to maintain secrecy over their bidding strategies as GDN was doing. However, it is unconventional to keep bidding strategies secret from the bidders themselves as was done in this case. This is especially the case as Professor Milgrom continually pointed out⁶⁸⁰ that one of the core goals in market design is to encourage bidder-truthful strategies, which themselves require bidders to understand precisely how their bids are being used.

390. Professor Milgrom opines that Bernanke resulted in more impressions being won by GDN and hence was output increasing.⁶⁸¹ I similarly opined that Bernanke would increase GDN impressions won. What Professor Milgrom does not consider is whether those impressions increased output across the entire market. While, in some cases, the output might be increased because publisher floors were being cleared more often, it is also the case, as I note and demonstrate, that GDN output may increase, but the overall

⁶⁷⁷ Rinard Report, ¶53.

⁶⁷⁸ Baye Report, ¶716, ¶720.

⁶⁷⁹ Gans Opening Report, ¶733. (“Google secretly launched Bernanke and all subsequent iterations of the program. Internally, when discussing the development of various GDN communications, Google explicitly made clear that “the first rule about Bernanke is we don't talk about Bernanke.” The intent of this secretive rollout was to ensure that publishers could not detect Bernanke's effects.”)

⁶⁸⁰ Milgrom Report, ¶63.

⁶⁸¹ Milgrom Report, ¶138.

market output may be unchanged. This was potentially a substantial effect as Google predicted an [REDACTED] percent fall in revenue for non-GDN ad-buying tool providers⁶⁸².

391. If GDN had been a competitor without market power, it would not have had the incentive or ability to implement Bernanke? This is because Bernanke relied upon GDN's ability to recoup losses from its more competitive prong (reducing take rates to win more impressions) by exploiting less competitive impression auctions (increasing take rates and passing those costs onto publishers). If GDN had not had monopoly power, there would have been insufficient opportunity to perform the balancing act that Bernanke relied upon to be profitable for Google. Thus, Bernanke cannot be characterized as competition on the merits precisely because it only had merit for Google when there was a lack of competition.⁶⁸³

392. What this means is that, in contrast to Professor Milgrom's analysis, the appropriate antitrust counterfactual to posit for Bernanke is not a market without Bernanke but a market with only the competitive prong of Bernanke. That competitive prong of Bernanke would be GDN just simply lowering its take rate to win more impressions without recouping losses in other less competitive situations. There was no historical constraint on GDN from doing so. Indeed, as Professor Milgrom notes, that is precisely what Google did initially: "Although this had the effect of slightly reducing Google Ads' overall revenue share, in experiments, that was more than offset by an increased volume of inventory won, so that the program led to an overall increase in profits for Google Ads."⁶⁸⁴ Interestingly, this also increased Google's profit both on GDN and AdX.⁶⁸⁵ It also improved publisher revenues.⁶⁸⁶

393. Professor Milgrom notes that Bernanke had a problem when it was increasing its take rate on bids for some impressions: if publishers understood that and could identify those impressions, they would have an incentive to increase their price floors to counter that effect. If this occurred, GDN's win rate could increase, although the benefits to advertisers would be diminished. He then combines a theoretical model with an empirical examination of one of its assumptions to conclude that advertiser surplus, as a whole but not necessarily for each advertiser⁶⁸⁷, would have increased as a result of implementing Bernanke. What he

⁶⁸² Gans Opening Report, ¶746 ("Google discussion of Bernanke states that applying the alpha multiplier to raise the first GDN bid into AdX, "helps GDN [...] beat out AdX Buyers." Google predicted that Bernanke would lead to an [REDACTED] % decrease in revenue for rival buying tools, equivalent to a loss of \$[REDACTED] per year.")

⁶⁸³ Professor Milgrom opines that other buy-side tools implemented Bernanke-like bid optimisation procedures. However, his example is that of Meta (*see* Milgrom Report, ¶127c). Meta momentarily participated as a buy-side tool and ad network catering to advertisers of different sizes and exited in 2020. Meta's ad network, Facebook Audience Network (FAN), was a very small layer in open web display (*see* Gans Opening Report, footnote 225). Moreover, other buy-side tools often submitted just a single bid to AdX (*see* Milgrom Report, ¶167). This too indicates their lack of market power as Google had sufficient advertisers competing for impressions that it was possible to submit two bids.

⁶⁸⁴ Milgrom Report, ¶136. *See also* Milgrom Report, ¶157.a.

⁶⁸⁵ Milgrom Report, footnote 245.; *See also* Milgrom Report, ¶157.a.

⁶⁸⁶ Milgrom Report, ¶157.a.

⁶⁸⁷ Milgrom Report, ¶155; *see also* Milgrom Report, Figure 4.

does not conclude, however, is whether the benefits to advertisers would have been higher had only the competitive prong of Bernanke been implemented. This is because under that prong, the publishers' reaction to increasing floor prices would not have occurred, and so advertiser benefits would have been even higher.

394. Turning now to publisher surplus, Professor Milgrom opines that Bernanke increased total publisher revenues relative to what they would have received without Bernanke. However, Bernanke's effect on total publisher revenues is ambiguous at best. But even if true, Professor Milgrom's conclusion does not mean that publishers would not have been better off had Google not engaged in anti-competitive conduct.

395. As already noted, had Google introduced just the 'bid increasing' prong of Bernanke (as it did when it introduced buy-side dynamic revenue sharing in January 2013), publisher revenues would have necessarily been higher because Google would only have been lowering its take rate to ensure that its GDN advertiser bids were more competitive.

396. As Professor Milgrom also observed,⁶⁸⁸ about [REDACTED] percent of publishers saw a reduction in revenues as a result of the implementation of Bernanke (with both prongs).⁶⁸⁹ With respect to the move from Bernanke to Global Bernanke, [REDACTED] percent of publishers saw revenue reductions.⁶⁹⁰ This is significant because if Google Ads was not a source of exclusive advertiser demand for impressions, those publishers who were negatively impacted by Google's conduct, could have switched their supply away from AdX and its Google Ads pipeline. Professor Milgrom implies that publishers could switch, but that was in the context of seeing a reduction in their total revenues, requiring them to consider switching *all* of their supply elsewhere.⁶⁹¹ However, this demonstrates precisely how competition was muted: publishers did not have the information regarding what Google's take rate was from advertiser expenditures to be able to optimize at the margin and allow others to exert competitive pressure at the margin as they were attempting to do through practices such as a Header Bidding.

397. Professor Milgrom notes that "Bernanke *maximizes* advertiser returns while maintaining a fixed revenue share."⁶⁹² It should be noted how striking the self-imposed Google constraint of "maintaining a fixed revenue share" is. The usual assumption is that firms will choose prices (in this case, a take-rate) in order to maximize their profits (or in this case, take-rate revenue). However, in implementing Bernanke,

⁶⁸⁸ Milgrom Report, ¶157.b.

⁶⁸⁹ Milgrom Report, ¶160.

⁶⁹⁰ Milgrom Report, ¶164.

⁶⁹¹ Milgrom Report, ¶174.

⁶⁹² Milgrom Report, ¶171.

Google chose to keep its revenue share (not revenues) as high as it was prior to Bernanke. Instead, as the implementation of dynamic revenue sharing with the competitive prong demonstrated, Google would increase its profits by simply reducing its take-rate on some share of auctions, so this response was viable. But, more generally, by imposing a constraint, Google was highly unlikely to be maximizing its profits from GDN. The logical conclusion is that they were taking into account profits from elsewhere – likely their ownership of AdX and sell-sided services. Specifically, had their average take rate risen, Google may have allowed liquidity to move to non-Google providers along with a flow of richer sources of information and an erosion of their market power in those markets. Hence, Google enacted a self-imposed constraint to prevent their bidding algorithms from giving too much to or taking too much from publishers. Therefore, the full Bernanke program cannot be rationalized by claiming it involved competition on the merits.⁶⁹³

398. Finally, there are additional areas where Professor Milgrom’s opinions are not relevant to this case. First, one consequence of Bernanke that I pointed out in my report⁶⁹⁴ was that GDN was able to win lower-valued impressions. Professor Milgrom opines that those lower-valued impressions were lost to GDN because non-GDN bidders were bidding higher amounts into AdX.⁶⁹⁵ His conclusion does not hold as Bernanke was only able to facilitate winning more impressions if it bid higher than others while Professor Milgrom is arguing those bids had to be higher still.

399. Second, as addressed in my Opening Report,⁶⁹⁶ a consequence of Bernanke was that rival buy-side tool suppliers won fewer impressions, but in situations where, precisely because of Bernanke, it was unclear whether those losses were because rival bids were too high or because GDN lowered its take rate to inflate bid prices. This distorted price signals to rivals of GDN but not to GDN itself, which understood the causes of the higher bids. Professor Milgrom does not dispute this but argues for other benefits from such confidentiality as a means of protecting GDN advertisers.⁶⁹⁷

400. Third, Professor Milgrom makes the strong claim that a “... publisher’s objective is its **revenue**, which is equal to the payment it receives for an impression.”⁶⁹⁸ This is not necessarily the case as publishers

⁶⁹³ Milgrom Report, ¶167.

⁶⁹⁴ Gans Opening Report, ¶759. (“Bernanke overrides the purpose of publisher-set price floors by inflating bids that would otherwise not clear the floor. By doing so, Bernanke enables lower-quality ads to be transacted and displayed on publishers’ properties. This harms publishers’ reputations, which in turn can significantly impact their revenue stream.”)

⁶⁹⁵ Milgrom Report, ¶127e.

⁶⁹⁶ Gans Opening Report, ¶717. (“The higher GDN win rate from the Bernanke program allowed Google to maintain a critical informational advantage over other market participants and, with that advantage, subvert the process of competition. While Google implemented these manipulations in ways that would maintain its own take rate, on average, unchanged, this was only achieved on average and likely led to its customers unknowingly paying higher prices to Google that could be achieved both immediately and in equilibrium had the competitive process and these practices been transparent to them.”); *see also* Gans Opening Report, ¶725.

⁶⁹⁷ Milgrom Report, ¶127f.

⁶⁹⁸ Milgrom Report, ¶53.

may also care about the type of ads. In my Opening Report, I discuss a case involving the [REDACTED], where actions that Google saw as revenue-maximizing to publishers led to quality issues that ultimately harmed the publisher's reputation.⁶⁹⁹ Publishers often set price floors to control ad quality, as low-price bidders usually serve low-quality ads. After the implementation of Bermanke, the [REDACTED] started experiencing clickbait ads promoting fake news.⁷⁰⁰ Google employees discovered that Bermanke overrode [REDACTED]' floor price on [REDACTED]% of problematic impressions.⁷⁰¹ This conflict highlights the importance of non-price ad features, such as ad quality and relevance, to publishers.

401. Fourth, Professor Milgrom also makes the claim that Bermanke is similar to competitor programs⁷⁰². Specifically, he cites Meta's Individual Dynamic Margin which enables buy-side bid optimization that varies revenue share per publisher, as well as a bidding strategy on Criteo that adjusts take rates per bid. However, Professor Milgrom fails to recognize that Meta and Criteo's programs do not use a "pool" of funds to enhance bids, indicating advertisers were not charged a different amount than what was passed to publishers, as in Bermanke.

402. Finally, Bermanke was updated to Alchemist to be compatible with the transition to a first-price auction format. Professor Milgrom concludes in Theorem 1 that the combined effort of Google's bid optimization and publisher's adjustments could only increase Google Ads' win rate if Google Ads' advertisers experienced increased surplus as well.⁷⁰³ However, Professor Milgrom makes numerous unsupported assumptions, such as the fact that publishers would optimally adjust floor prices (which he does not substantiate and empirical evidence suggest is incorrect).⁷⁰⁴ Moreover, his Figure 4 shows that for low increases in slice win rate only [REDACTED]% of slices experience increasing advertiser surplus, suggesting that [REDACTED]% of slices of advertisers could be harmed.⁷⁰⁵

⁶⁹⁹ Gans Opening Report, ¶755. ([REDACTED] escalation issue described below is a notable example of this situation. Thus, any increase in publisher payout due to Bermanke distorts the negative impact of a lower-quality ad appearing on a publisher's website.")

⁷⁰⁰ GOOG-DOJ-15084405 at -408. "Fwd: [REDACTED] Escalation/ Next Steps" (December 14, 2016). Internal email thread between [REDACTED]. ("We have begun to see ads seeking to capitalize on Fake News related to politicians and celebrities. The motivation here appears to be clickbait.")

⁷⁰¹ GOOG-DOJ-15769995 at -998. "Protecting Publishers from Objectionable Ads" (May 2017). Internal Google document on potential harmful ads for publishers. There is a high likelihood that both documents reference the same [REDACTED] escalation. The email thread is dated from December 2016 and the strategy document is from May 2017. Both documents refer to problematic ads as the reason for the escalation. ("From what I could tell, our auction optimizations (Bermanke) were responsible for [REDACTED]% of impressions in the [REDACTED] escalation.")

⁷⁰² Gans Opening Report, Section IV.

⁷⁰³ Milgrom Report, ¶151, ¶152.

⁷⁰⁴ GOOG-AT-MDL-001873044 at -44 ("Setting optimal floor prices is challenging and requires a lot of time and effort. Many publishers are unable to dedicate sufficient resources to such a complex problem, leading to suboptimal floors that result in missed revenue opportunities.")

⁷⁰⁵ Milgrom Report, Figure 4.

2. Sell-Side Dynamic Revenue Sharing

403. Sell-Side Dynamic Revenue Sharing was an algorithmic procedure implemented by Google on its AdX product to alter the way it evaluated the bids it received by selectively altering the AdX take rate with a similar approach as to how it altered Google Ad's take rate when supplying bids to AdX under Bernanke. Like Bernanke, these precise changes were not clearly communicated to market participants with the aim of having participants continue to believe that Google's contractually-agreed upon take rate was the same for each and every transaction.⁷⁰⁶ Instead, the take rate was adjusted on a per transaction basis to both increase the number of impressions completed on AdX and to ensure that the *average* take rate was unchanged even though the take rates themselves were altered. This would be akin to a (sell-side) real estate agent adjusting its commission across sales to ensure that its average commission was the same while allowing it to charge a lower commission for more competitive deals and a higher commission for less competitive deals while all the time obscuring that fact to its own clients. While this might increase the real estate agent's sales, at the same time, the seller of a house in a less competitive context would pay a higher commission and hence, be worse off as a result of this practice. Had the actual commission been disclosed, in a competitive market, that seller might choose another real estate agent.

404. Professor Milgrom notes that, to implement this delicate balancing act, Google required significant information.⁷⁰⁷ I note that this implies that any exchange that did not have access to sufficient information would be unable to undertake these adjustments and implement this balancing act. It is natural to assume that such advantages are more likely to be available to exchanges that complete a larger share of transactions.

405. As with Bernanke, the initial version of DRS, DRSv1, had a single prong that involved Google reducing its take-rate while the other version of DRS, DRSv2, added an additional (or non-competitive) prong that involved Google increasing its take-rate on other impressions to make up for the reduction in its take-rate on the first (or competitive) prong. In my evaluation of Google's conduct in this regard, as I explained in my Opening Report, I did not see the single-pronged DRSv1 as anti-competitive and found it to be likely pro-competitive as it only involved a reduction in AdX's "prices." What I opined was anti-competitive conduct, which was Google's move from DRSv1 to DRSv2 with its additional prong that involved increasing its take rate. This allowed Google to cross-subsidize its lower take-rate on some impressions effectively allowing it to engage in a form of algorithmic predation using its scale and taking

⁷⁰⁶ As I explain in my Opening Report, DRS v1 was not initially publicly disclosed (*See* Gans Opening Report, ¶793). A communication regarding opting out of DRS was shared with publishers over a year later, when DRS v2 was launched (*See* Gans Opening Report, ¶794).

⁷⁰⁷ Milgrom Report, ¶422, ¶423.

advantage of its opportunity to earn higher prices on non-competitive impression auctions to subsidize pricing that deprived rival exchanges of scale and its information gathering opportunities. As noted in my Opening Report, that deprivation of information was part of Google's intent.⁷⁰⁸ DRSv2 harmed both publishers and advertisers.⁷⁰⁹

406. Professor Milgrom provides a detailed analysis of the pro-competitive potential of DRSv1. He not only agrees with my conclusion⁷¹⁰ but provides a stronger evaluation of its properties.⁷¹¹ Professor Milgrom goes on to conclude that DRSv1 was profitable for Google,⁷¹² and thus, a viable option for it.

407. When it comes to the evaluation of DRSv2, Professor Milgrom saw it as “*restor[ing]* the average AdX revenue share to the levels that applied prior to DRS.”⁷¹³ As I noted in paragraph 396 above with respect to Bermanke, why restoration of a revenue share should be a goal for Google rather than maximizing its own revenues is a puzzle from an economic perspective. DRSv2 did this by adding a new prong that allowed it to use its algorithmic to “*recoup* debts previously accrued by publishers and advertisers under DRS v2.”⁷¹⁴ Why a price reduction under DRSv1 becomes a “debt” under DRSv2 that needs to be recouped by Google is unclear from for an economist, and certainly is antithetical for competitive rivalry. What this means is that Google would have preferred to use this method of price discrimination to actually raise average take rates above its contractually obligated level and imposed a constraint to avoid legal complications.⁷¹⁵

408. Once again, however, as I opined was the case with Bermanke, this does not mean that all publishers earned higher revenue as a result of DRSv2; some may experience revenue reductions and because of non-transparency would not have been aware this was a result of Google's higher revenue share for them rather

⁷⁰⁸ Gans Opening Report, ¶779. (“DRS v2 and tDRS, deviated from DRS v1 in two ways. First, the discounted take rates were funded by an increase in the take rate on other auctions with the same publisher. This was achieved by accounting for discounts as a ‘debt’ that would need to be recouped from raising take rates on other transactions over a specified time period. Second, Google chose not to make publishers aware of the take rates for each transaction. This was an intentional choice by Google. Instead, in later implementations, publishers were given an opportunity to opt out of DRS but without proper information to make that choice.”)

⁷⁰⁹ See Weinberg Opening Report, ¶12dii, 204, 226.

⁷¹⁰ Milgrom Report, ¶429.

⁷¹¹ Milgrom Report, ¶433.

⁷¹² Milgrom, ¶435.

⁷¹³ Emphasis added. Milgrom Report, ¶437.

⁷¹⁴ Emphasis added. Milgrom Report, ¶440.

⁷¹⁵ Google was cognizant of the legal implications of raising the AdX take rate above contractual obligations. For instance, a Google documents flags [REDACTED]

[REDACTED] See GOOG-NE-06842715 at -719. “AdX Auction Optimizations” (May 10, 2016). Google presentation on RPO-DRS commercialization. Another document states: “from a legal perspective, [REDACTED]

[REDACTED] See GOOG-NE-06860424. “Meeting Notes: DRX Suite Commercialization” (June 16, 2016). “Meeting Notes: DRX Suite Commercialization” (June 16, 2016).

than some other market variable. In other words, those experiencing revenue reductions could not assign blame to Google, a necessary condition for triggering a search for alternative providers.

409. Professor Milgrom does not consider these competitive consequences because he only analyzes the impact of DRSv2 on total impressions sold on AdX and total publisher revenues compared with the absence of DRS altogether.^{716,717} As I have already noted, the correct evaluation would be to compare DRSv2 to DRSv1.⁷¹⁸ In that case, taking into account changes in advertiser bids and publisher floors, total publisher revenue would be lower while, given Google incentives of the scale of the adjustments being made, total impressions on AdX were likely to be higher. That is, DRSv2 allowed Google to use high take rates to subsidize the costs (that Professor Milgrom terms “debt”) involved in lowering take rates to increase the volume of impressions completed on AdX. Once Google’s own incentives are taken into account, the clear role of Google’s ability to increase take rates on impressions to subsidize lower prices elsewhere can be laid bare. Indeed, Professor Milgrom’s Theorem 8 demonstrates that the only beneficiary from DRSv2 compared to an absence of DRS is Google. As DRSv1 improved publisher revenues,⁷¹⁹ then the logical conclusion from Professor Milgrom’s formal model is that publisher revenues would decline from DRSv1 to DRSv2 while Google’s profits would increase. Thus, there is no alignment of interests, as Professor Milgrom opines.⁷²⁰

410. In my Opening Report, I provided an example that illustrated how publishers may be harmed by DRSv2.⁷²¹ Professor Milgrom takes issue with this example. First, he asserts that the calculation of the “debt” is misleading given advertiser adjustments. However, what is incurred as a debt on the publisher's

⁷¹⁶ Milgrom Report, ¶444.

⁷¹⁷ Milgrom Report, ¶446.

⁷¹⁸ Gans Opening Report, Section VIII.C.

⁷¹⁹ Milgrom Report, ¶433.

⁷²⁰ Similarly, in providing his result in Theorem 9 that tDRS increased publisher revenues from all sources (not just AdX), Professor Milgrom is comparing a situation to an absence of DRS rather than DRSv1.

⁷²¹ Gans Opening Report, ¶810. (“To set the ideas more concretely, consider the following example. Imagine a publisher who got a winning bid of \$6 from the Header Bidding auction, net of any fees. This bid then gets transferred to DFP as a line item, and AdX uses that as a price floor when it is conducting a second-price auction for this impression due to Last Look. Further, imagine that, when initiated, the AdX auction has a price floor of \$3 and elicits two bids above that price floor, \$7 and \$5, where neither includes the AdX take rate of 20%. Without the effect of the DRS v2, the AdX auction would return no successful bid, and the impression would be awarded to the Header Bidding winner, and the publisher would generate a revenue of \$6. This is because the AdX auction would have the effective price floor of \$6 due to the Header Bidding winning bid and Last Look, and the 2 bids it generated net of the take rate would be $7 * 0.8 = \$5.6$ and $5 * 0.8 = \$4$. Since neither of them is above the price floor of \$6, the AdX auction would fail to clear and lead to the explained outcome. Now consider the effects of DRS v2. Under this take rate adjustment, AdX would decrease its take rate to 14% so that the highest bid would be equal to $7 * 0.86 = \$6.02$. In this case, since the highest bid net of the exchange take rate, which is \$6.02, is higher than the effective price floor, which is \$6, AdX would be able to clear the impression and, in line with the second-price auction format, the clearing price would be the price floor plus 1 cent, since the second highest bid net of the exchange take rate is below the price floor. Hence, the publisher would generate revenue of \$6.01. However, the publisher would also incur the debt of $6.01 - (7 * 0.8) = \$0.41$, which it would have to pay back to AdX in another auction. In sum, without the combined effects of DRS v2 and Last Look, the publisher would gain \$6 over the long run. However, with the combined effects of the DRS v2 and Last Look, it generates $6.01 - 0.41 = \$5.6$ in the long run, which constitutes a loss for the publisher.”)

“account” is correct in my example, and while there may be circumstances under which it may be recovered in various ways, this does not change my conclusion that it will be recovered and so is a reduction in the publisher’s surplus from that transaction. Second, he opines that my example applies in certain circumstances and that it may not arise in other circumstances. My example was designed to show that publisher harm can arise, not an evaluation of all of the circumstances under which it could arise. Professor Milgrom does not argue otherwise except to reiterate his opinion that publisher revenues will rise in total comparing DRSv2 to no DRS.⁷²² Finally, Professor Milgrom contends that Google’s conduct does not cause the publisher harm in my example and instead blames of publishers who could inflate their header bid outcome. He advocates that publishers engage in costly mitigation strategies to counter potential harm arising from Google’s conduct. Professor Milgrom opines that publishers could simply “turn off” DRS if they experienced revenue reductions, but I note that for this to occur, they would have to have a clear understanding that DRS was at fault rather than some other explanation. Given Google’s non-transparency, it is unclear how publishers could make that decision optimally.

411. In seeking to excuse Google’s conduct, Professor Milgrom’s assertion that other market participants have engaged in similar conduct is incorrect. Based on the evidence presented by Professor Milgrom, [REDACTED]
[REDACTED].⁷²³ These programs do not behave like Google’s DRS, which could raise or lower the [REDACTED] % take rate per publisher, without the publisher’s control.

412. Google’s conduct was also contrary to publishers’ interests. Based on a 2018 internal Google document, publishers have a perception that [REDACTED]
[REDACTED]⁷²⁴ Additionally, Google’s content filtering is “always working to improve our classification quality, but cannot guarantee that each ad is classified correctly.”⁷²⁵ For example, in 2017, Google discussed developing a new tool to filter bad ads. Google noted the difficulty

⁷²² Milgrom Report, ¶466.

⁷²³ [REDACTED]

⁷²⁴ GOOG-NE-11809343 at -358. “DRX Unified Yield Management Strategy Review” (July 9, 2018). Internal Google PowerPoint on DRX. (“Why do pubs set up higher floors on AdX? [REDACTED]”)

⁷²⁵ See Google, “Block sensitive categories,” Google Ad Manager Help (Undated). Accessed August 6, 2024. <https://support.google.com/admanager/answer/2541069?sjid=14973969736947852707-EU#available-sensitive>

of a content filtering tool, including the need for a manual review, defining what constitutes a bad ad, etc.,⁷²⁶ which could lead escalations to take several days to get resolved.⁷²⁷ Google's content filtering might not align with a publisher's standard for bad ads. For example, in the [REDACTED] escalation, Google noted: "We have intentionally not blacklisted [REDACTED] despite numerous user and Googler complaints, as we have verified that it remains compliant with Google policies."⁷²⁸ Google employees acknowledged that publisher floors would be the best way to block bad ads, absent Google's harmful conduct, such as Bernanke.⁷²⁹ Moreover, Google noted that it was "not building these tools for the general market of publishers; they are aimed at the most sensitive group."⁷³⁰ This would leave many publishers with no other choice than setting high floors to protect themselves from bad ads. For the reasons mentioned, publishers may not want to resort to only using content filtering to protect their content.

413. Even if we accept all the assumptions of his models, Professor Milgrom only shows, in theory, that "publishers accrue zero debt on net in expectation."⁷³¹ Figures 36, 37, and 38 in my Opening Report show that the individual impact on publishers can be heterogenous and harmful for some individual publishers.

414. Professor Baye also opines that the empirical evidence I presented in my Opening Report showing how AdX's take rate substantially varies based on the inventory type⁷³² price through DRS is "insufficient to establish price discrimination" because, in his opinion, these price variations are "random" and not based on the level of competition faced by AdX.⁷³³ This is false. In my Opening Report, I showed the extensive evidence that publishers set higher floors on AdX compared to other exchanges and that, among several other goals, publishers' motivation was to induce more competition between Google buyers and other

⁷²⁶ GOOG-DOJ-15769995 at -997. "Protecting Publishers from Objectionable Ads" (May 2017). Internal Google document on potential harmful ads for publishers. ("Most of these applications require some form of manual review, which means we will need to develop some definable criteria for what constitutes an objectionable ad.")

⁷²⁷ GOOG-DOJ-15084405 at -409. "Fwd: [REDACTED] Escalation/ Next Steps" (December 14, 2016). Internal email thread between [REDACTED]. ("In a sweep today based on the [REDACTED] escalation we suspended [REDACTED] AdWords accounts, blacklisted [REDACTED] IP address, blacklisted [REDACTED] domains, added [REDACTED] celebrity images to KIM (Known Image Matcher) for AdX enforcement. Last week we also took action against [REDACTED] AdWords accounts, [REDACTED] IP address, and [REDACTED] domains for similar violations.")

⁷²⁸ GOOG-DOJ-15084405 at -409. "Fwd: [REDACTED] Escalation/ Next Steps" (December 14, 2016). Internal email thread between [REDACTED].

⁷²⁹ GOOG-DOJ-15769995 at -998. "Protecting Publishers from Objectionable Ads" (May 2017). Internal Google document on potential harmful ads for publishers. ("From what I could tell, our auction optimizations (Bernanke) were responsible for [REDACTED] % of impressions in the [REDACTED] escalation. [...] So the assumption is that without Bernanke, these creatives would never have made it past the cpm threshold? [...] Pretty much, well they would have still delivered but [REDACTED] less than it did – the [REDACTED] floors were like \$[REDACTED]. [...] wow. Makes me think we should just shut off Bernanke for these pubs [...] floors would have worked pretty well, but we have auction optimizations to jump the floors reducing effectiveness. We need to get better at applying our auction optimizations so that they don't benefit bad actors.")

⁷³⁰ GOOG-DOJ-15769995 at -996. "Protecting Publishers from Objectionable Ads" (May 2017). Internal Google document on potential harmful ads for publishers. ("We do not even want these tools adopted generally – that would lead to unnecessary blocking, causing revenue loss to our publishers and Google and reducing inventory access to advertisers marked as objectionable in error.")

⁷³¹ Milgrom Report, ¶442.

⁷³² Gans Opening Report, Figure 35.

⁷³³ Baye Report, ¶634.

buyers.⁷³⁴ Publishers also set higher floors on impressions that they can get higher prices for and where competition between buyers and exchanges is expected to be more intense. AdX's ability to beat the floor set by publishers thanks to DRS, where the floor was too high *for AdX*, is therefore directly related to the level of competition faced for a given impression. Further, as explained in my Opening Report, DRS allows AdX to exploit Google's Last Look advantage in its take rate adjustment.⁷³⁵ As such, DRS takes into account the level of exchange competition faced by AdX with ad server information it has on other exchanges' bids due to Last Look.⁷³⁶

415. Professors Baye further asserts that my data analyses of DRS are incorrect because DRS does not take into account geographic or inventory type constraints when determining AdX's take rate.⁷³⁷ Professor Rinard further asserts that the analysis must be incorrect because such constraints don't exist explicitly in Google's code.⁷³⁸ Yet, the result of DRS is to create take rate differences across geography and inventory types as shown in the data.

416. Both Professor Baye's and Professor Rinard's claims are irrelevant and a misrepresent of my analysis. Professor Rinard's statement that publishers' "balance can never be negative" simply means (which Professor Baye explains) that Google balances pools across different geographies and ad types for the same publisher. My geographic market is the United States, and for this reason, I analyze harm in this

⁷³⁴ Gans Opening Report, Footnote 653. ("GOOG-NE-11809343 at 358, "DRX Unified Yield Management Strategy Review" (July 9, 2018). Internal Google PowerPoint on DRX. ("Why do pubs set up higher floors on AdX? Global Bernanke subsidizes pubs who set higher floors on AdX in general, which could be a factor; Pubs set different floors for the same buyer on different exchanges to simulate a real-time waterfall and soft floor the buyers (like DBM), and AdX primarily bears the brunt of these higher floors; Pubs have the perception that undesirable ads on AdX is correlated with low CPMs, and getting higher floors will "protect" them; Pubs have been willing to tolerate some revenue loss in exchange for reduced dependence on Google as a whole.")); See also Gans Opening Report, ¶570. ("In particular, DA enabled Google to override the Waterfall hierarchy that often resulted in AdX ranking lower than other exchanges. GOOG-DOJ-14875108 at -110. "Inventory access – Strategy Summit 2-pager" (August 15, 2014). Internal Google strategy document on yield optimization on display. ("[...] today yield optimization happens through impressions being passed to one exchange / buyer with a certain minimum CPM (floor), and if they can't meet the floor, it gets sent to a [REDACTED] % fill exchange" – most often AdSense/AdX. Currently [REDACTED] % of the impressions on AdX and AdSense are "Passbacks" from other exchanges [...].") The document states that Google has "a very strong position as a [REDACTED] % fill exchange".")

⁷³⁵ Gans Opening Report, ¶809. ("As a result, in the long run, the publishers lose revenue due to the combined effects of Last Look and DRS v2.") See also GOOG-DOJ-14162326 at -326. "Re: GOOGLE INTERNAL Copy of Q1 Programmatic OKR: margin manipulation investigation - Invitation to comment." (November 8, 2017). Internal email thread between [REDACTED] and others. ("AdX gets to pay high and win whenever AppNexus is present with a high CPM, and can pay low when AppNexus bids low. AppNexus in contrast can't reliably save money on queries where AdX bids low, because it doesn't know AdX bids. This has fundamentally nothing to do with dynamic revshare -- dynamic revshare is just yet another way for AdX to exploit the last look advantage.")

⁷³⁶ GOOG-DOJ-14162326 at -326. "Re: GOOGLE INTERNAL Copy of Q1 Programmatic OKR: margin manipulation investigation - Invitation to comment." (November 8, 2017). Internal email thread between [REDACTED] and others. ("AdX gets to pay high and win whenever AppNexus is present with a high CPM, and can pay low when AppNexus bids low. AppNexus in contrast can't reliably save money on queries where AdX bids low, because it doesn't know AdX bids. This has fundamentally nothing to do with dynamic revshare -- dynamic revshare is just yet another way for AdX to exploit the last look advantage.")

⁷³⁷ Baye Report, ¶623.

⁷³⁸ Rinard Report, ¶105, Footnote 63.

market regardless of how Google chose to recoup a publisher's "debt" in another geographic market.⁷³⁹ The data analysis in my Opening Report shows how Google charges different take rates for in-app and web display and how it charges sometimes for than [REDACTED] % systematically more some publishers on their *U.S. properties*. My conclusions are consistent with Professor Rinard's source code findings that Google chooses to balance pools without geographic and ad type considerations – i.e., creating debt in some inventory and geographic segments and recouping in others.

417. In Appendix H, I discuss in detail Professor Baye's proposed changes to my analysis. None of those changes apply to my analysis and therefore do not change my opinion.

⁷³⁹ Note that Professor Baye agrees that the relevant geographic market is the United States.

VI. APPENDICES

A. Materials Relied Upon & Materials Considered

1. Materials Relied Upon

Academic Literature and Published Books

Abrantes-Metz, Rosa M., and Albert Metz. "Modeling the Dynamics of Network Entry and Competition Under Single-and Multi-Homing." *Available at SSRN 3862805* (2021).

Adams, William James & Janet L. Yellen, "Commodity Bundling and the Burden of Monopoly," *Q.J. Econ.* 90, (1976): 475.

Ambrus, Attila, Emilio Calvano, and Markus Reisinger. "Either or both competition: A "two-sided" theory of advertising with overlapping viewerships." *American Economic Journal: Microeconomics* 8, no. 3 (2016): 189-222.

Amir, Rabah, Igor Evstigneev, and Adriana Gama. "Oligopoly with network effects: firm-specific versus single network." *Economic Theory* 71, no. 3 (2021): 1203-1230.

Anderson, Simon P., and Jean J. Gabszewicz. "The media and advertising: a tale of two-sided markets." *Handbook of the Economics of Art and Culture* 1 (2006): 567-614.

Anderson, Simon P., Øystein Foros, and Hans Jarle Kind. "The importance of consumer multihoming (joint purchases) for market performance: Mergers and entry in media markets" *Journal of Economics & Management Strategy* 28, no. 1 (2019): 125-137.

Angrist Joshua, and Jorn-Steffen Pischke. *Mostly Harmless Econometrics*: Chapter 5.2, Princeton University Press, NJ (2008): 169-182.

Athey, Susan, Emilio Calvano, and Joshua S. Gans. "The impact of consumer multi-homing on advertising markets and media competition." *Management Science* 64, no. 4 (2018): 1574-1590.

Athey, Susan, Fiona Scott Morton. "Platform Annexation" *Antitrust Law Journal* vol. 84, no.3 (2022).

Baker, Jonathan. "Market Definition: An Analytical Overview." *Antitrust Law Journal* 74 (2007).

Baker, Jonathan. "Stepping out in and Old Brown Shoe: In Qualified Praise of Submarkets." *Antitrust Law Journal* 68, no. 203 (2000): 207-208.

Bakos, Yannis & Erik Brynjolfsson, "Bundling Information Goods: Pricing, Profits, and Efficiency," *Mgmt. Sci.* 45 (1999): 1515.

Baye, Michael R., Matias Barenstein, Debra J. Holt, Pauline M. Ippolito, James M. Lacko, Jesse B. Leary, Janis K. Pappalardo, Paul A. Pautler, and Michael G. Vita. "Economics at the FTC: The Google-DoubleClick merger, resale price maintenance, mortgage disclosures, and credit scoring in auto insurance." *Review of Industrial Organization* vol.33.(2008): 211-230.

Blaug, Mark. *Economic history and the history of economics* (1986), Brighton: Wheatsheaf.

Bowman, Ward S., "Tying Arrangements and the Leverage Problem," *Yale Law Journal* 67, 19 (1957).
Blair, Roger and David Kaserman, *Antitrust Economics*, Oxford (2009): at 107-109.

Bryan, Kevin A., and Joshua S. Gans. "A theory of multihoming in rideshare competition." *Journal of Economics & Management Strategy* 28, no. 1 (2019): 89-96.

Carlton, Dennis W. & Michael Waldman, "The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries," *Rand J. Econ.* 33 (2002).

Carlton, Dennis W; Perloff, Jeffrey M. "Modern Industrial Organization". 4th Ed. Pg. 65. 4th Ed. Pg. 65.
Coate, Malcolm B. "The Use of Natural Experiments in Merger Analysis." *Journal of Antitrust Enforcement* no. 2 (2013): 123-45.

Coate, Malcom B., Jeffrey H. Fischer. "A Practical Guide to the Hypothetical Monopolist Test for Market Definition." *Journal of Competition Law and Economics* 4 (2008): 10131-1035.

Davis, Peter, Eliana Garces. "Quantitative Techniques for Competition and Antitrust Analysis". *Princeton University Press* (2019).

de Fontenay, Catherine C., and Joshua S. Gans. "A bargaining perspective on strategic outsourcing and supply competition." *Strategic Management Journal* 29, no. 8 (2008): 819-839.

de Fontenay, Catherine C., and Joshua S. Gans. "Vertical integration in the presence of upstream competition." *RAND Journal of Economics* (2005): 544-572.

de Fontenay, Catherine C., Joshua S. Gans, and Vivienne Groves. "Exclusivity, competition and the irrelevance of internal investment." *International Journal of Industrial Organization* 28, no. 4 (2010): 336-340.

Economides, Nicholas, and Steven C. Salop. "Competition and integration among complements, and network market structure." *Journal of Industrial Economics* (1992): 105-123.

Elhauge, Einer. "Tying, bundled discounts, and the death of the single monopoly profit theory." *Harv. L. Rev.* 123 (2009): 397.

Evensen, Charlotte B., and Atle Haugen. "The impact of targeting technologies and consumer multi-homing on digital platform competition." *NHH Dept. of Economics Discussion Paper* 13 (2021).
Farrell, Joseph. "Coordination and lock-in: competition with switching costs and network effects." *Handbook of Industrial Organization* (2007).

Gabszewicz, Jean J., and Xavier Wauthy. "Two-sided markets and price competition with multi-homing." LIDAM Discussion Papers CORE 2004030, CORE (2004).

Gans, Joshua S. "Concentration-based merger tests and vertical market structure." *Journal of Law and Economics* 50, no. 4 (2007): 661-681.

Garcia Pires, Armando J. "Content Provision in the Media Market with Single-Homing and Multi-Homing Consumers." *Review of Network Economics* 19, no. 1 (2020): 43-83.

Ghose, Anindya. *Tap: Unlocking the Mobile Economy* MIT Press (2017).

Grossman, Sanford J., and Oliver D. Hart. "The costs and benefits of ownership: A theory of vertical and lateral integration." *Journal of Political Economy* 94, no. 4 (1986): 691-719.

Haan, Marco A., Gijsbert Zwart, and Nannette Stoffers. "Choosing your battles: endogenous multihoming and platform competition." *TILEC Discussion Paper No. DP2021-011* (2021).

Haitao, Tony Cui, Anindya Ghose, Hanna Halaburda, Raghuram Iyengar, Koen Pauwels, S. Sriram, Catherine Tucker, and Sriraman Venkataraman. "Informational Challenges in Omnichannel Marketing: Remedies and Future Research." *Journal of Marketing* 85, No. 1 (2021).

Hart, Oliver, and Bengt Holmstrom. "A theory of firm scope," *Quarterly Journal of Economics* 125, no. 2 (2010): 483-513.

Hart, Oliver, and John Moore. "Property Rights and the Nature of the Firm." *Journal of Political Economy* 98, no. 6 (1990): 1119-1158.

Hart, Oliver, Jean Tirole, Dennis W. Carlton, and Oliver E. Williamson. "Vertical integration and market foreclosure." *Brookings papers on economic activity. Microeconomics* (1990): 205-286.

Hovenkamp, Herbert. "Platforms and the Rule of Reason: The American Express Case." *Columbia Business Law Review* 35, 54 (2019).

Huntington-Klein, Nick. "The effect: An introduction to research design and causality." Chapman and Hall/CRC (2021).

Iansiti, Marco, "The Value of Data and Its Impact on Competition," *Harvard Business School* NOM Unit Working Paper No. 22-002, (2021).

Inderst, Roman, and Christian Wey. "Bargaining, mergers, and technology choice in bilaterally oligopolistic industries." *RAND Journal of Economics* (2003): 1-19.

Jeitschko, Thomas D., and Mark J. Tremblay. "Platform competition with endogenous homing." *International Economic Review* 61, no. 3 (2020): 1281-1305.

Katz, Michael, and Jonathan Sallet. "Multisided platforms and antitrust enforcement." *Yale Law Journal* 127 (2017).

Kwoka, John and Margaret Slade. "Second Thoughts on Double Marginalization." *Antitrust* 34, no.2 (2019): 55-56.

Lee, Alec M.. "Decision rules for media scheduling: static campaigns." *OR* 13, no.3. (1962); 229.

Leonard, Gregory K. and Wu, Lawrence Y. "Assessing the Competitive Effects of a Merger: Empirical Analysis of Price Differences Across Markets and Natural Experiments" *Antitrust* 22 (2007): 96.

Lewis, Randall A, Justin M Rao. "The Unfavorable Economics of Measuring the Returns to Advertising." *The Quarterly Journal of Economics*. (2015): 1941-1973.

Liu, Fan, David S. Sibley, and Wei Zhao. "Vertical Contracts That Reference Rivals." *Review of Industrial Organization*. 56, no. 2. (2020): 381-407.

Marshall, Alfred. *Principles of Economics*. 1890.

McAfee, R. Preston, John McMillan & Michael D. Whinston, “Multiproduct Monopoly, Commodity Bundling, and Correlation of Values,” *Q.J. Econ.* 104, (1989).

Moresi, Serge, Steven Salop, John Woodbury. “Market Definition.” *Antitrust Economics for Lawyers* (2017): Chapter 1, Section 4.

Morton, Fiona M. Scott. “Contracts that reference rivals.” *Antitrust* 27, no. 3 (2013).

Nalebuff, Barry “Bundling as an Entry Barrier”, 160 *Quarterly Journal of Economics* 160 (2004).

Newman, John M. "The Output-Welfare Fallacy: A Modern Antitrust Paradox." *Iowa L. Rev.* 107 (2021).

Nicholson, Walter. *Microeconomic Theory: Basic Principles and Extensions*. 9th ed., Thomson/South-Western (2005).

O’Brien, Daniel P., and Steven C. Salop. “Competitive effects of partial ownership: Financial interest and corporate control.” *Antitrust LJ* 67 (1999).

Ordover, Janusz A., Garth Saloner, and Steven C. Salop. “Equilibrium vertical foreclosure.” *The American Economic Review* (1990): 127-142.

Pleatsikas, Christopher, and David Teece. “The analysis of market definition and market power in the context of rapid innovation.” *International Journal of Industrial Organization* 19, no.5 (2001): 665-693.

Randall A Lewis, Justin M Rao. “The Unfavorable Economics of Measuring the Returns to Advertising.” *The Quarterly Journal of Economics* (2015): 1941-1973.

Reiley, David. “Field Experiments on the Effects of Reserve Prices in Auctions: More Magic on the Internet.” *RAND Journal of Economics*. Vol. 37, no. 1 (2006): 195–211.

Rey, Patrick, Jean Tirole. “A primer on foreclosure.” *Handbook of industrial organization* 3 (2007): 2145-2220.

Riordan, Michael. “Vertical Integration.” *The New Palgrave Dictionary of Economic*, 2 (2007).

Rochet, Jean-Charles, and Jean Tirole. “Two-Sided Markets: A Progress Report.” *The RAND Journal of Economics*, 37, no. 3 (2006): 645–67.

Rose, Nancy and Jonathan Sallet. “Ohio v. American Express: The Exception that should not become the Rule.” *Antitrust* 36, 76 (2022).

Roth, Alvin E. “What have we learned from market design?” *Economic Journal* 118, no. 527 (2008).

Rubinfeld Daniel L. “Market Definition with Differentiated Products: The Post/Nabisco Cereal Merger” *Antitrust Law Journal* 68, 163 (2000).

Salop, Steven, Daniel Francis, Lauren Sillman, Michael Spero. “Rebuilding Platform Antitrust: Moving on from Ohio v. American Express.” *Antitrust Law Journal* 84, 883 (2022).

Salop, Steven, Serge Moresi and John Woodbury. "Market Definition." *Antitrust Economics for Lawyers* (LexisNexis), Chapter 1, at Section 4.

Schmalensee, Richard, "Commodity Bundling by Single-Product Monopolies," *J.L. & Econ.* 25 (1982): 67.

Segal, Ilya R., and Michael D. Whinston. "Exclusive contracts and protection of investments." *RAND Journal of Economics* (2000): 603-633.

Schwartz, Marius, and Robert J. Reynolds. "Contestable markets: An uprising in the theory of industry structure: Comment." *The American Economic Review* 73.3 (1983): 488-490.

Spengler, Joseph J. "Vertical Integration and Antitrust Policy." *Journal of Political Economy* 50, no.4 (1950): 347-352.

Varian, Hal, *Microeconomic Analysis*, 3rd ed., Norton, (1992).

Whinston, Michael D., "Tying, Foreclosure, and Exclusion," *Am. Econ. Rev.*, vol.80. (1990):837.

Williamson, Oliver E. *Markets and Hierarchies: Analysis and Antitrust Implications* New York: Macmillan Publishers (1975).

Wu, Tim. "The American Express Opinion, Tech Platforms & the Rule of Reason." *The Journal of Antitrust Enforcement*, Forthcoming, (2018).

Bates Stamped Productions

GOOG-AT-MDL-015402767 at -770. "Preliminary Video Recommendation" (October 2013). Internal presentation on video advertising.

GOOG-NE-06866438 at -511. "Sell-side All Hands" (February/March 2018). Internal Google PowerPoint on sell-side tools topics (yield maximization, web developers, etc.).

GOOG-NE-06842715 at -719. "AdX Auction Optimizations" (May 10, 2016). Google presentation on RPO-DRS commercialization.

GOOG-NE-06860424. "Meeting Notes: DRX Suite Commercialization" (June 16, 2016).

GOOG-NE-07251927 at -995. "Display and Video Strategy Book" (August 2014). Internal Google document about its business, platforms, and strategies.

GOOG-AT-MDL-006787342 at -369. "CG&E M&A Programmatic Training" (January 27, 2022). Google presentation for an internal training on programmatic topics.

GOOG-TEX-00873439 at -439. “Thoughts on Product/Advertiser Segmentation Around GDN & DBM” (October 25, 2013). Internal Google document discussing how to help advertisers to use GDN and DBM.

GOOG-DOJ-03238507 at -247. “Media Review” (September 2015). Internal presentation showing Google’s customer segmentation of GDN and DBM.

GOOG-AT-MDL-004258873 at -893. “LMC & Google: Consortium Exchange Workshop” (December 5, 2016). External presentation on Google’s value to publishers.

GOOG-AT-MDL-013281506 at -508. “Publisher Per Buyer SafeFrame Control.” (May 2, 2022). Internal document on tools used by publishers to control for the quality of ads displayed.

GOOG-DOJ-15084405 at -408, at -409. “Fwd: NYTimes Escalation/ Next Steps” (December 14, 2016). Internal email thread between [REDACTED].

GOOG-DOJ-15769995 at -998, at -997, -at 996. “Protecting Publishers from Objectionable Ads” (May 2017). Internal Google document on potential harmful ads for publishers.

GOOG-DOJ-14162326 at -326. “Re: GOOGLE INTERNAL Copy of Q1 Programmatic OKR: margin manipulation investigation - Invitation to comment.” (November 8, 2017). Internal email thread between [REDACTED], and others.

GOOG-TEX-00843142 at -145. “First-price bidding Update” (September 3, 2019). Internal Google presentation.

GOOG-AT-MDL-013987096 at -102. “Publisher Monetization 101” (March 29, 2023). Internal Google presentation. An example is presented to describe the process of “last look.”

GOOG-NE-11809343 at -358. “DRX Unified Yield Management Strategy Review” (July 9, 2018). Internal Google PowerPoint on DRX.

GOOG-AT-MDL-016886793 at -827. “Trust me, I’m fair: Analysing Google’s latest practices in ad tech from the perspective of EU competition law” (October 7, 2019). TILEC discussion paper no. DP 2019-029 addressing whether Google’s switch to a unified auction has addressed concerns.

GOOG-NE-04599495 at -495. “1P Bid Data Transfer Balancing transparency to publishers, with protecting buyer data and user privacy” (Undated). Internal Google document.

GOOG-AT-MDL-C-000019273 at -360. Robin Lee Report in the US v. Google.

[REDACTED]

GOOG-DOJ-AT-00569936 at -936. "Increase GDN margin on AdX from 14% to 15%" (March 2014). Internal gTrade document on GDN take rate increase and the expected impact.

GOOG-DOJ-32022633 at -633, -637. "Re: FORK: ALI thread for [REDACTED]" (October 8, 2018). Internal Google email thread on an increase request for active line items for [REDACTED] with

[REDACTED]
[REDACTED]
[REDACTED] Cox.

GOOG-NE-06872310 at -321. "PRD/Strate review: Network health" (Undated). Internal presentation discussing increase in line items.

GOOG-DOJ-06875572 at -574. "PRD/Strate review: Network health" (Undated). Internal presentation discussing increase in line items

GOOG-TEX-00084837 at -837 "Re: Potentially raising LI limits for [REDACTED]" (December 13, 2017). Internal Google email thread on an increase request for line items for [REDACTED] with [REDACTED]

[REDACTED]

GOOG-TEX-00090969 at -969. "Re: Ultraprio – Increase the ALI for [REDACTED]". Internal Google email thread on an increase request for line items for active line items for [REDACTED] r with [REDACTED]

[REDACTED]
[REDACTED]

GOOG-AT-MDL-B-001391461. "LAUNCHED! AdX Dynamic Revenue Share (DRS)" (September 2, 2015). Internal email thread between [REDACTED]
[REDACTED] and others.

GOOG-AT-MDL-001279248 at -261. "Platforms pricing overview" (Q3 2018). Internal Google presentation.

GOOG-DOJ-15178498 at -499. "Re: Report on the two-sided dynamic revenue sharing". (October 12, 2014). Email communications between Google employees.

[REDACTED]

GOOG-NE-12106704 at -711. “AdMob + AdManager UX greyzone” (October 2019). Internal presentation on in-app publishers.

[REDACTED]

[REDACTED]

[REDACTED]

DM_GOOG_0000050 at -054, -056. “Re: [Action required] Reduce the number of your active line items in your DFP account.” (July 11, 2017). Google Email to [REDACTED] on requiring a reduction in number of active line items with [REDACTED]

[REDACTED]

GOOG-NE-09709810 at -812. (“Unified Auction Changes (Sellside) Executive Update – Aug 12, 2019” (August 13, 2019). Internal Email from [REDACTED]

[REDACTED]

[REDACTED]

GOOG-DOJ-AT-02137454 at -457. “Ad Manager Repricing” (February 2019). Internal Google proposal for DFP repricing.

GOOG-DOJ-15289466.

GOOG-AT-MDL-004119136.

GOOG-AT-MDL-004119128.

GOOG-AT-MDL-004406987.

GOOG-AT-MDL-004119112.

GOOG-AT-MDL-004118710.

GOOG-AT-MDL-004118704.

GOOG-DOJ-07799121 at -122. “Re: [GPX] Meeting Agenda for May 1, 2013.” (May 1, 2018). Internal email thread discussing discount approvals for [REDACTED].

GOOG-DOJ-AT-02423786 at -787. "Uniform Treatment for DFP Remnant and AdX under EDA" (April 2019). Internal design document for EDA.

GOOG-DOJ-AT-00569648 at -648. "Fwd: Frist-price & Removing pricing knobs" (May 11, 2019). Internal email thread with [REDACTED].

GOOG-AT-MDL-001847442 at -465 to -467. "Investment review for emerging areas incl. Commerce/SPA deepdive." (March 7, 2022). Internal Google document discussing Yavin for eBay.

GOOG-TEX-00682264 at -265. "Re: Unified Auction Changes (Sellside) Executive Update" (August 19, 2019). Internal email thread with [REDACTED].

GOOG-AT-MDL-013268463. "AdX Rate Card" (April 12, 2023). Internal Google spreadsheet showing Google's rates card.

GOOG-DOJ-09715071 at -072. "Re: Just not cricket" (October 1, 2019). Internal Google email thread discussing the complaint of [REDACTED] with [REDACTED].

GOOG-DOJ-AT-01804815 at -820. "1st Price Migration Overview" (October 30, 2018). Internal Google Presentation.

GOOG-NE-09180083 at -169. "2019 Video Deep Dive – Sissie/Duk" (September 2019). Internal Google presentation on video inventory.

GOOG-TEX-00105361 at -394. "FAN Bidding in to DRX and AdMob." (April 28, 2017). Internal Google presentation.

GOOG-DOJ-AT-01811903 at -913. "A buy-side overview to publisher yield: Header Bidding, First Look, and Exchange Bidding" (November 2016). Internal Google presentation.

GOOG-NE-03467508 at -559. "Business Forecast Meeting (Sell-Side)" (June 24, 2019). Internal Google presentation to review past performance, forecast the sell-side business, and develop business strategies.

GOOG-DOJ-15375402 at -402. "Re: [REDACTED] DRX Renewal - Finance Questions" (March 15, 2018). Internal email thread between [REDACTED] and [REDACTED].

GOOG-DOJ-12948968 at -969. "Fwd: 1st Price Changes" (June 10, 2019). Internal Google email thread between [REDACTED] and [REDACTED].

GOOG-DOJ-17360264 at -318. "adspro" (November 26, 2010). Internal Google email newsletter from [REDACTED].

GOOG-NE-05243813 at -873, -874. "Display Strategy Working Document" (August 2012). Internal Google document explaining platforms and strategies.

GOOG-TEX-00701689 at -690. "Thoughts on Display & Video Ads Strategy" (undated) Internal Google Document

GOOG-AT-MDL-019416878 at -879. "Scalable Comms – Recontracting Phase 1" August 23, 2019 (*per metadata*). Internal Google email template to inform publishers of new Google Services Agreement.

GOOG-TEX-00089241 at -241, -242. "Re: The REAL Header Bidding Threat ..." (October 15, 2015). Internal Google email thread with [REDACTED]

GOOG-TEX-01201334 at -362. "Buyside Deep Dive" (March 2018). Internal presentation on buy-side tools.

GOOG-TEX-00997803 at -806, 807. "Criteo: solution overview" (Undated.) Internal Google document providing an overview of Criteo.

GOOG-NE-13279022 at -027. "DFP Fees on Google-monetized impressions" (June 4, 2012). Internal Google Presentation to get approval on DFP fee changes.

GOOG-NE- 02111579 at -579. "Re: sale reductions." (March 23, 2009). Internal email thread.

GOOG-AT-MDL-C-000085053.

GOOG-NE-02327581 at -606. "Winning against AppNexus" (October 26, 2016). Google presentation comparing AppNexus to DFP and DRX shares of footprint by DFP tags and AdX Direct tags.

GOOG-AT-MDL-003563640 at -649. "LTV Overview 7 2020 Highlights" (August 2021). Google presentation on advertiser lifetime value. The slide shows that long-tail advertisers spend \$ [REDACTED] per quarter.

GOOG-NE-02345420. "Evolution of Aristotle & Lincoln" (December, 2013).

GOOG-NE-02340053. "Project Lincoln Working Session" (April, 2013). Internal presentation on DBM and GDN differentiation.

GOOG-NE-04732984, at -984. "Demand elasticity on AdX web publishers" (May 8, 2018). gTrade internal document on take rate increase simulation.

GOOG-DOJ-AT-02118579, at -581. "Sell-side Pricing Strategy Review" (September 2018).

GOOG-DOJ-14875108 at -110. "Inventory access – Strategy Summit 2-pager" (August 15, 2014). Internal Google strategy document on yield optimization on display.

GOOG-TEX-00441752 at -783. "XFP Pricing Implementation" (Undated). Internal Google presentation on the impact of the DFP fee change.

GOOG-TEX-00120929 at -930. "Jedi++ Header Bidding Response Options" (October 13, 2016). Internal documentation on strategy concerning Header Bidding.

GOOG-NE-04423109 at -123. "Pricing – Track 1 Discussion" (April 4, 2017). Internal deck on pricing strategy.

GOOG-TEX-00106259 at -260. "Re: Rubicon margins" (November 4, 2017). Internal Google email responding to ad exchanges cutting fees.

GOOG-NE-05271214 at -222. "Re: Rubicon margins" (November 4, 2017). Internal Google email responding to ad exchanges cutting fees.

GOOG-TEX-00679746 at -746. "Re: PRIVILEGED AND CONFIDENTIAL" (June 25, 2018). Internal email thread between [REDACTED].

GOOG-NE-11809454 at -454. "SellSide Guiding... - Just how much pressure we are under?..." (August 6, 2018). Internal Google comments on SellSide Guiding Principles document.

GOOG-AT-MDL-008928515. "DFP FAQ" (February 2020). Internal Google fact sheet providing an overview of fees.

GOOG-AT-MDL-C-000056931 at -7187. "DVAA 2017 Strategy Book" (2017).

GOOG-AT-MDL-C-000008293 at -313. "DVAA Leadership Strategy Offsite" (2018).

GOOG-DOJ-17941508 at -530. "AdWords User Experience Research" (November 7, 2013).

GOOG-DOJ-32277366 at -367. "Re: percentage experiments on adx auction changes" (July 11, 2014). Internal email thread on a Google experiment on take rate.

GOOG-NE-10873225 at -230. "Perceptions of ROI: CX Lab Final Insights Deck" (Undated). Presentation summarizing the results of a 3-part longitudinal study conducted from February 2018 to July 2019 to understand what ROI and Search performance means to advertisers, how they measure it and monitor it.

GOOG-TEX-00971726 at -736. "Header Bidding Observatory #2" (May 2017). Internal Google presentation detailing Header Bidding adoption.

GOOG-AT-MDL-008932468, at -471.

GOOG-DOJ-06867901.

Case Law and Government Publications

Analysis of Proposed Consent Order, Nestle Holdings, Inc. No. 21-0174 (June 25, 2003)

Brown Shoe Co., Inc. v. United States, 370 U.S. 294, 1962.

Competition & Markets Authority (CMA). "Online platforms and digital advertising." (July 1, 2020).

Department of Justice. "Monopoly Power, Market Definition, and the Cellophane Fallacy." (Undated) Accessed August 5, 2024. <https://www.justice.gov/archives/atr/monopoly-power-market-definition-and-cellophane-fallacy>

Federal Trade Commission (FTC). “Statement of Federal Trade Commission concerning Google/DoubleClick.” (December 20, 2007).

French Competition Authority (FCA). “Decision 21-D-11 of 7 June 2021 regarding practices implemented in the online advertising sector”. (July 26, 2021).

USA v. Google. No. 20-cv-3010, 2024.

USA v. Google, No. 1:23-cv-00108-LMB-JFA, 2024.

U.S. Department of Justice and the Federal Trade Commission. “Merger Guidelines.” (2023).

United States v. Microsoft, 253 F.3d 34, 51 (D.C. Cir. 2001).

Other Sources

AdExchanger. “AT&T Unveils Xandr, Its Answer To The Future Of Advertising” (September 25, 2018). Accessed on August 23, 2024. <https://www.adexchanger.com/platforms/att-unveils-xandr-its-answer-to-the-future-of-advertising/>.

AdExchanger, “Did Google Just Kill Independent Attribution?” (May 7, 2018). Accessed September 5, 2024. <https://www.adexchanger.com/analytics/did-google-just-kill-independent-attribution/>

AdExchanger. “How Direct Deals are Evolving in the Age of Programmatic” (November 30, 2018). Accessed September 5, 2024. <https://www.adexchanger.com/the-sell-sider/how-direct-deals-are-evolving-in-the-age-of-programmatic/>

AdExchanger. “Yahoo Shuttering Its SSP Is Evidence That Ad Exchanges Are Becoming Interchangeable” (February 15, 2023). Accessed on August 24, 2024. <https://www.adexchanger.com/platforms/yahoo-shuttering-its-ssp-is-evidence-that-ad-exchanges-are-becoming-interchangeable/>

AdExchanger, “What Publishers Need to Know About Google’s Optimized Pricing,” (June 8, 2022). Accessed September 5, 2024. <https://www.adexchanger.com/the-sell-sider/what-publishers-need-to-know-about-googles-optimized-pricing/>

AppLovin. “Take your monetization to the next level” (Undated). Accessed August 30, 2024. <https://www.applovin.com/max>

Axios. “Exclusive: Yahoo to lay off more than 20% of staff as it shrinks ad biz” (February 9, 2023). Accessed on August 24, 2024. <https://www.axios.com/2023/02/09/yahoo-layoffs-2023-tech-media-companies>

BCG. “Measure to Grow: Drive Double-Digit Growth by Measuring Marketing Right.” (November 15, 2021). Accessed on September 3, 2024 <https://www.bcg.com/measuring-digital-marketing-to-drive-growth>

Blackstone. “Blackstone Announces Significant Investment in Simpli.fi, a Leading Programmatic Advertising Platform, at \$1.5 Billion Valuation” (June 28, 2021). Accessed on August 29, 2024. <https://www.blackstone.com/news/press/blackstone-announces-significant-investment-in-simpli-fi-a-leading-programmatic-advertising-platform-at-1-5-billion-valuation/>

Bloomberg Media. “Shifting to an Audience-First Mentality.” (October 24, 2022) Accessed September 5, 2024. <https://www.bloombergmedia.com/press/shifting-to-an-audience-first-mentality/>

Boston Consulting Group. “A Guaranteed Opportunity in Programmatic Advertising” (February 7, 2018). Accessed on May 2, 2024. <https://www.bcg.com/publications/2018/guaranteed-opportunity-programmatic-advertising>.)

Britannica. “empirical evidence” (Undated). Accessed on September 3, 2024. <https://www.britannica.com/topic/empirical-evidence>

Business Insider. “Microsoft just closed its acquisition of adtech firm Xandr. Here are 5 other companies it could buy to compete with Google and Meta.” (June 6, 2022). Accessed on August 23, 2024. <https://www.businessinsider.com/microsoft-potential-adtech-acquisitions-that-could-build-advertising-business-2022-6?op=1>

Business of Apps. “App development cost” (Undated). Accessed August 9, 2024. <https://www.businessofapps.com/app-developers/research/app-development-cost/>

Business Wire. “Meet Magnite, the Largest Independent Omnichannel Sell-Side Platform in the World” (June 30, 2020). Accessed on August 23, 2024. <https://www.businesswire.com/news/home/20200630005319/en/Meet-Magnite-the-Largest-Independent-Omnichannel-Sell-Side-Platform-in-the-World>.

Chartboost. "Capture new audiences; Maximize experiences; Grow your business; Increase Revenue" (Undated). Accessed August 30, 2024. <https://www.chartboost.com/company/>

Criteo. "Q4 & Full Year 2022 Earnings" (February 8, 2023). Accessed on August 29, 2024. https://criteo.investorroom.com/download/Criteo_Q4-2022-Earnings_Presentation_FINAL.pdf

CNN Business. "Facebook boycott: View the list of companies pulling ads" (July 2, 2020). Accessed on June 4, 2024. <https://www.cnn.com/2020/06/28/business/facebook-ad-boycott-list/index.html#>

Department of Justice, Monopoly Power, Market Definition, and the Cellophane Fallacy. (Undated) <https://www.justice.gov/archives/atr/monopoly-power-market-definition-and-cellophane-fallacy> Accessed August 5, 2024.

Digital Turbine. "DT Exchange x AdColony Merge is Now Complete." (January 11, 2024). Accessed August 22, 2024. <https://www.digitalturbine.com/blog/dt-exchange-x-adcolony-merge-is-now-complete>

Digital Turbine. "Form 10-K for the fiscal year ended March 31, 2024" (2024). pg.44. Accessed 8/22/2024: <https://ir.digitalturbine.com/sec-filings/all-sec-filings/content/0001628280-24-025455/0001628280-24-025455.pdf>

Forbes. "What Is Retargeting And Why Is It Important?" (May 20, 2020). Accessed on August 29, 2024. <https://www.forbes.com/councils/forbesagencycouncil/2020/05/20/what-is-retargeting-and-why-is-it-important/>

Forbes Technology Council. "Marketing ROI: Three Foundational Rules for Successful Measuring." (February 29, 2024). Accessed on September 3, 2024. <https://www.forbes.com/councils/forbestechcouncil/2024/02/29/marketing-roi-three-foundational-rules-for-successful-measuring/>

Google. "DFP and dynamic allocation." DoubleClick for Publishers Help (Undated). Accessed on September 22, 2015. https://web.archive.org/web/20150922150140/https://support.google.com/dfp_premium/answer/3447903

Google. "Block sensitive categories." Google Ad Manager Help (Undated.) Accessed August 6, 2024. <https://support.google.com/admanager/answer/2541069?sjid=14973969736947852707-EU#available-sensitive>

Google. “About ad formats available in different campaign types” Google Ads Help. (Undated). Accessed on September 3, 2024 https://support.google.com/google-ads/answer/1722124?hl=en&ref_topic=3121941&sjid=1065949975726748684-NC#zippy=

Google. “Updates to how publishers monetize with AdSense” (November 2, 2023). Accessed on September 2, 2024. <https://blog.google/products/adsense/evolving-how-publishers-monetize-with-adsense/>.

Google. “Line item types and priorities” Google Ad Manager Help. (Undated). Accessed on August 28, 2024. <https://support.google.com/admanager/answer/177279?hl=en>

Google. “About Display Expansion on Search campaigns”. Google Ads Help (Undated). Accessed on September 4, 2024. <https://support.google.com/google-ads/answer/7193800?hl=en>

Headerbidding.co. “Insertion Order (IO) – Everything You Need to Know” (December 21, 2023). Accessed on May 9, 2024. <https://headerbidding.co/insertion-order/>

Index. “Channels and Formats” (Undated). Accessed on August 23, 2024. <https://www.indexexchange.com/product/channels-formats/>.

Interactive Advertising Bureau Europe. “What would an Internet without targeted ads look like?” (2021). Accessed August 12, 2024. https://iabeurope.eu/wp-content/uploads/2021/04/IAB-Europe_What-Would-an-Internet-Without-Targeted-Ads-Look-Like_April-2021.pdf

Magnite. “Every Screen, Everywhere” (Undated). Accessed on August 23, 2024. <https://www.magnite.com/buyers/>

Measure School. “How to Setup a Google ads Search Campaign (and avoid fatal mistakes)” (June 29, 2023). Accessed on September 3, 2024. <https://measureschool.com/google-ads-search-campaign/>

Nelson, Ken and Kathleen Ollen. “Connecting Marketing KPIs to Business Objectives.” Deloitte Digital. (September 22, 2022). Accessed on September 3, 2024. <https://www.deloittedigital.com/content/dam/digital/global/legacy/documents/offerings/offering-20220928-measurement-series-part-1.pdf>

Nielsen. “2023 Annual Marketing Report.” (December 2022). Accessed on September 2, 2024. <https://www.nielsen.com/insights/2023/need-for-consistent-measurement-2023-nielsen-annual-marketing-report/>.

OpenX. "About Us" (undated). Accessed on August 23, 2024. <https://www.openx.com/company/>

OpenX. "Premium Inventory" (Undated). Accessed August 23, 2024. <https://www.openx.com/why-openx/premium-inventory/>

OpenX. "We've got huge scale and industry-leading cross-device / cross-format reach" (Undated). Accessed on August 23, 2024. <https://www.openx.com/why-openx/our-exchange/>.

OpenX, "Selling Rules" (Dec. 12, 2016), https://web.archive.org/web/20170708051049/https://docs.openx.com/Content/publishers/userguide_inventory_realtimeselling.html

Pathmatics - Data Collection. "How We Collect Our Data" (Undated). Accessed on June 4, 2024. <https://pathmatics.zendesk.com/hc/en-us/articles/360026316391-How-We-Collect-Our-Data>

Pitchbook. "AdColony General Information." (Undated). Accessed August 22, 2024. <https://pitchbook.com/profiles/company/54261-46#signals>

Publift. "Google AdMob vs AdSense: What's the Difference?" (August 14, 2024). Accessed on September 5, 2024. <https://www.publift.com/blog/google-admob-vs-adsense>

PubMatic. "The Supply Chain of the Future. Built for you." (undated). Accessed on August 23, 2024. <https://pubmatic.com/about-us/>

PubMatic. "PubMatic SSP: Maximize ROI and Control Your Digital Supply Chain" (undated). Accessed on August 23, 2024. <https://pubmatic.com/products/pubmatic-ssp-for-buyers/>.

Sharethrough. "A Mission to Help the Independent Web Grow & Thrive" (undated). Accessed on August 23, 2024. <https://www.sharethrough.com/company>

Sharethrough. "Optimizing Ads for Attention & Performance" (undated). Accessed on August 23, 2024. <https://www.sharethrough.com/advertisers>.

Sovrn. "AD EXCHANGE" (undated), Accessed on August 23, 2024. <https://www.sovrn.com/ad-exchange/>.

Sovrn. "Sovrn Eliminates Take Rate with Bundled Offering" (March 27, 2023), Accessed on August 23, 2024. <https://www.sovrn.com/blog/sovrn-eliminates-take-rate-with-bundled-offering/>

The Clorox Company. "Clorox's Response to Hate Speech" (June 28, 2020). Accessed on June 4, 2024.
<https://www.thecloroxcompany.com/blog/clorox-to-stop-advertising-on-facebook/>

The New York Times. "CVS, Dunkin', Lego: The Brands Pulling Ads From Facebook Over Hate Speech" (Updated July 7, 2020). Accessed on May 9, 2024.
<https://www.nytimes.com/2020/06/26/business/media/Facebook-advertising-boycott.html>

Twenga Solutions. LinkedIn Page. Accessed on September 2, 2024
<https://www.linkedin.com/company/twenga/>

Unity Ads. "Grow your mobile app with Unity Ads" (Undated). Accessed August 30, 2024.
<https://unity.com/products/unity-ads>

U.S. Senator John McCain, interview with *Washington Post*, C1, March 24, 2004

U. S. Department of Justice and Federal Trade Commission, *Horizontal Merger Guidelines*, December 2023.

Reuters. "Paying for news: Price-conscious consumers look for value amid cost-of-living crisis" (September 28, 2023). Accessed August 12, 2024. <https://reutersinstitute.politics.ox.ac.uk/paying-news-price-conscious-consumers-look-value-amid-cost-living-crisis#header--8>

Yahoo! Advertising "Our DSP" (undated). Accessed on August 24, 2024.
<https://www.advertising.yahooinc.com/our-dsp>

Yahoo!Finance. "NewsCorp just pumped \$10 million into ad tech company AppNexus as part of a \$31 million round" (September 28, 2016). Accessed September 3, 2024.
<https://finance.yahoo.com/news/newscorp-just-pumped-10-million-150000508.html>

Production Letters

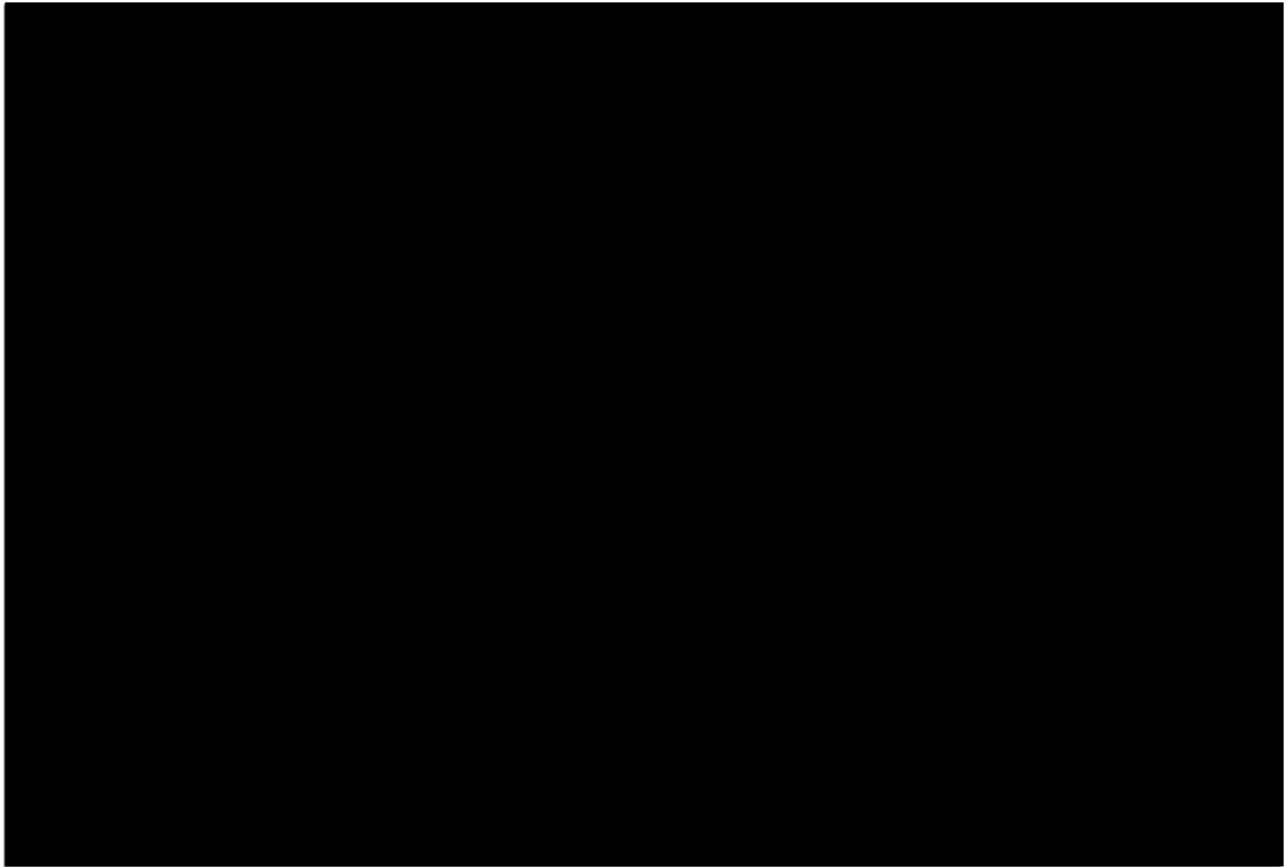
"2023.04.17 Transmittal Letter re Data Production," (April 17, 2023). Letter describing produced data.

GOOG-AT-MDL-C-000012795 at -803. "2023.09.08 Letter from D. Pearl to M. Freeman" (September 8, 2023). Letter describing produced data from RFP 57.

GOOG-AT-MDL-C-000012771 at -771, -772. "2023.07.14 D. Pearl Letter to K. Garcia" (July 14, 2023). Letter describing data productions from RFP 56.

Datasets

Third-Party Data Sources



Google Data Sources

<i>Data Source Name</i>	<i>Bates Numbers / File Names in Production</i>
DOJ RFP 57 – DFP Fees	GOOG-AT-DOJ-DATA-000247050 - GOOG-AT-DOJ-DATA-000247053
DRX Internal Stats	GOOG-AT-DOJ-DATA-000066799 - GOOG-AT-DOJ-DATA-000245943
RFP 243 - AdX Submission	GOOG-AT-MDL-DATA-000066537- GOOG-AT-MDL-DATA-000482007; GOOG-AT-MDL-DATA-000508827 – GOOG-AT-MDL-DATA-000558886 (Supplement); GOOG-AT- MDL-DATA-000561536 - GOOG-AT-MDL- DATA-000564882 (Correction); GOOG-AT-MDL-DATA-000606366- GOOG-AT-MDL-DATA-000653766 (Refresh)

RFP 243 – Google Ads Submission	GOOG-AT-MDL-DATA-000486626 - GOOG-AT-MDL-DATA-000488277; GOOG-AT-MDL-DATA-000653818 - GOOG-AT-MDL-DATA-000654235 (Refresh)
RFP 243 – DFP Reservations	GOOG-AT-MDL-DATA-000482008 - GOOG-AT-MDL-DATA-000482531; GOOG-AT-MDL-DATA-000605252- GOOG-AT-MDL-DATA-000605355 (Refresh)
DV360 XBridge	GOOG-AT-MDL-DATA-000561263 - GOOG-AT-MDL-DATA-000561420; GOOG-AT-MDL-DATA-000606342- GOOG-AT-MDL-DATA-000606365 (Refresh)
RFP 20	GOOG-AT-MDL-DATA-000508816
RFP-243 AdSense Backfill	GOOG-AT-MDL-DATA-000482532 - GOOG-AT-MDL-DATA-000486515; GOOG-AT-MDL-DATA-000605356 - GOOG-AT-MDL-DATA-000606028 (Refresh)
MDL XPP-M Submission	GOOG-AT-MDL-DATA-000561031 - GOOG-AT-MDL-DATA-000561262; GOOG-AT-MDL-DATA-000654236- GOOG-AT-MDL-DATA-000654256 (Refresh)
MDL XP Submission	GOOG-AT-MDL-DATA-000558890 – GOOG-AT-MDL-DATA-000559276; GOOG-AT-MDL-DATA-000606053- GOOG-AT-MDL-DATA-000606112 (Refresh)

2. Materials Considered

Pleadings

The live pleadings (complaint and answer) within the matter of *The State of Texas, et al. v. Google*, Case Number: 4:20-cv-00957-SDJ, including the Fourth Amended Complaint.

Discovery Responses

All available discovery responses produced within the matter of *The State of Texas, et al. v. Google*, Case Number: 4:20-cv-00957-SDJ, including:

1. The Parties' amended initial disclosures;
2. The Parties' discovery responses and objections to Interrogatories, Requests for Admission, and Requests for Production; and
3. Google's written responses to Plaintiffs' Rule 30(b)(6) Notice.

Deposition Transcripts & Exhibits

All available deposition transcripts and exhibits within the matter of *The State of Texas, et al. v. Google*, Case Number: 4:20-cv-00957-SDJ, including:

1. Deposition and Exhibits of [REDACTED]
2. Deposition and Exhibits of [REDACTED]
3. Deposition and Exhibits of [REDACTED]
4. Deposition and Exhibits of [REDACTED]
5. Deposition and Exhibits of [REDACTED]
6. Deposition and Exhibits of [REDACTED]
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50. Deposition and Exhibits of [REDACTED]
51. Deposition and Exhibits of [REDACTED]
52. Deposition and Exhibits of South Carolina ([REDACTED]), April 23, 2024
53. Deposition and Exhibits of Indiana ([REDACTED]), April 26, 2024
54. Deposition and Exhibits of Indiana ([REDACTED]), April 26, 2024
55. Deposition and Exhibits of Nevada ([REDACTED]), April 29, 2024
56. Deposition and Exhibits of Arkansas ([REDACTED]), May 1, 2024
57. Deposition and Exhibits of Alaska ([REDACTED]), May 3, 2024
58. Deposition and Exhibits of Florida ([REDACTED]), April 22, 2024
59. Deposition and Exhibits of Idaho ([REDACTED]), May 3, 2024
60. Deposition and Exhibits of Idaho ([REDACTED]), May 3, 2024
61. Deposition and Exhibits of Kentucky ([REDACTED]), April 25, 2024
62. Deposition and Exhibits of Louisiana ([REDACTED]), May 3, 2024
63. Deposition and Exhibits of Mississippi ([REDACTED]), April 25, 2024
64. Deposition and Exhibits of Mississippi ([REDACTED]), April 25, 2024
65. Deposition and Exhibits of Missouri ([REDACTED]), May 10, 2024
66. Deposition and Exhibits of Montana ([REDACTED]), May 1, 2024
67. Deposition and Exhibits of North Dakota ([REDACTED]), May 2, 2024
68. Deposition and Exhibits of Puerto Rico ([REDACTED]), May 1, 2024
69. Deposition and Exhibits of South Dakota ([REDACTED]), April 29, 2024
70. Deposition and Exhibits of Texas ([REDACTED]), May 24, 2024
71. Deposition and Exhibits of Texas ([REDACTED]), April 17, 2024
72. Deposition and Exhibits of Utah ([REDACTED]), April 30, 2024
73. Deposition and Exhibits of Utah ([REDACTED]), April 30, 2024
74. Deposition and Exhibits of [REDACTED]
75. Deposition and Exhibits of A [REDACTED]
76. Deposition and Exhibits of [REDACTED]

- 77. Deposition and Exhibits of [REDACTED]
- 78. Deposition and Exhibits of [REDACTED]
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- 81. Deposition and Exhibits of [REDACTED]
- 82. Deposition and Exhibits of [REDACTED]
- 83. Deposition and Exhibits of [REDACTED]
- 84. Deposition and Exhibits of [REDACTED]

All available deposition transcripts and exhibits within the matter of *USA v. Google*, Case Number: 1:23-cv-00108-LMB-JFA, including:

- 85. Deposition and Exhibits of [REDACTED]
- 86. Deposition and Exhibits of [REDACTED]
- 87. Deposition and Exhibits of [REDACTED]
- 88. Deposition and Exhibits of [REDACTED]
- 89. Deposition and Exhibits of [REDACTED]
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- 93. Deposition and Exhibits of [REDACTED]
- 94. Deposition and Exhibits of [REDACTED]
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137. Deposition and Exhibits of
138. Deposition and Exhibits of

All available deposition transcripts and exhibits within the matter of *In re: Google Digital Advertising Antitrust Litigation*, Case Number: 1:21-md-03010-PKC, including the depositions and exhibits of:

139.		6/19/2024
140.		6/20/2024
141.		6/21/2024
142.		5/21/2024
143.		6/25/2024
144.		6/25/2024
145.		6/27/2024
146.		7/23/2024
147.		7/23/2024
148.		6/18/2024
149.		5/7/2024
150.		7/9/2024
151.		7/10/2024
152.		4/25/2024

153.	[REDACTED]	7/10/2024
154.	[REDACTED]	6/24/2024
155.	[REDACTED]	7/12/2024
156.	[REDACTED]	6/12/2024
157.	[REDACTED]	6/13/2024
158.	[REDACTED]	5/2/2024
159.	[REDACTED]	6/28/2024
160.	[REDACTED]	6/6/2024
161.	[REDACTED]	6/28/2024
162.	[REDACTED]	7/3/2024
163.	[REDACTED]	6/4/2024
164.	[REDACTED]	7/28/2024
165.	[REDACTED]	7/10/2024
166.	[REDACTED]	6/25/2024
167.	[REDACTED]	6/26/2024
168.	[REDACTED]	6/10/2024
169.	[REDACTED]	6/27/2024
170.	[REDACTED]	6/13/2024
171.	[REDACTED]	6/7/2024
172.	[REDACTED]	6/25/2024
173.	[REDACTED]	6/28/2024
174.	[REDACTED]	5/24/2024
175.	[REDACTED]	6/24/2024
176.	[REDACTED]	6/27/2024
177.	[REDACTED]	6/11/2024
178.	[REDACTED]	6/12/2024

Other available deposition transcripts and exhibits, including the depositions and exhibits of:

179.	[REDACTED]	10/2/2020
180.	[REDACTED]	10/16/2020
181.	[REDACTED]	7/28/2020
182.	[REDACTED]	7/21/2020
183.	[REDACTED]	10/26/2020
184.	[REDACTED]	11/6/2020
185.	[REDACTED]	7/31/2020
186.	[REDACTED]	9/25/2020
187.	[REDACTED]	10/20/2020
188.	[REDACTED]	7/17/2020
189.	[REDACTED]	11/9/2020
190.	[REDACTED]	11/19/2020
191.	[REDACTED]	7/24/2020
192.	[REDACTED]	7/14/2020
193.	[REDACTED]	11/10/2020
194.	[REDACTED]	11/2/2020

195.	[REDACTED]	9/28/2020
196.	[REDACTED]	2/3/2022
197.	[REDACTED]	8/11/2021
198.	[REDACTED]	2/28/2022
199.	[REDACTED]	10/19/2021
200.	[REDACTED]	12/9/2021
201.	[REDACTED]	9/17/2021
202.	[REDACTED]	11/20/2020
203.	[REDACTED]	3/30/2021
204.	[REDACTED]	10/28/2021
205.	[REDACTED]	8/10/2021
206.	[REDACTED]	3/31/2021
207.	[REDACTED]	4/2/2021
208.	[REDACTED]	4/22/2021
209.	[REDACTED]	10/28/2021
210.	[REDACTED]	7/22/2021
211.	[REDACTED]	10/6/2021
212.	[REDACTED]	7/20/2021
213.	[REDACTED]	8/12/2021
214.	[REDACTED]	9/28/2021
215.	[REDACTED]	5/17/2021
216.	[REDACTED]	9/7/2021

Expert Reports & Declarations

All available expert reports, including appendices, backup materials, and cited materials, within the matter of *The State of Texas, et al. v. Google*, Case Number: 4:20-cv-00957-SDJ, including:

1. 2024.06.07 Expert Report of Jeffrey S. Andrien
2. 2024.06.07 Expert Report of Joshua Gans, as well as 2024.07.24 Errata and Supplemental Appendix D
3. 2024.06.07 Expert Report of Jacob Hostetler
4. 2024.06.07 Expert Report of John Chandler
5. 2024.06.07 Expert Report of Matthew Weinberg
6. 2024.06.07 Expert Report of Parag Pathak
7. 2024.07.30 Expert Report of Anindya Ghose
8. 2024.07.30 Expert Report of Donna L. Hoffman
9. 2024.07.30 Expert Report of Douglas Skinner
10. 2024.07.30 Expert Report of Itamar Simonson
11. 2024.07.30 Expert Report of Martin C. Rinard
12. 2024.07.30 Expert Report of Paul R. Milgrom
13. 2024.07.30 Expert Report of Steven N. Wiggins

14. 2024.08.06 Expert Report of Michael R. Baye
15. 2024.08.06 Expert Report of Jason Nieh

All available expert reports (with redactions) within the matter of *USA v. Google*, Case Number: 1:23-cv-00108-LMB-JFA, including:

1. Declarations of Google Employees
2. 2023.12.22 Expert Report of Gabriel Weintraub, GOOG-AT-MDL-C-000018734
3. 2023.12.22 Expert Report of R. Ravi, GOOG-AT-MDL-C-000019017
4. 2023.12.22 Expert Report of Robin S. Lee, GOOG-AT-MDL-C-000019273
5. 2023.12.22 Expert Report of Rosa Abrantes-Metz, GOOG-AT-MDL-C-000019786
6. 2023.12.22 Expert Report of Thomas S. Respass, GOOG-AT-MDL-C-000020106
7. 2023.12.22 Expert Report of Timothy Simcoe, GOOG-AT-MDL-C-000020274
8. 2024.01.13 Errata to Abrantes-Metz Expert Report, GOOG-AT-MDL-C-000020435
9. 2024.01.13 Errata to Ravi Expert Report, GOOG-AT-MDL-C-000020437
10. 2024.01.13 Errata to Respass Expert Report, GOOG-AT-MDL-C-000020440
11. 2024.01.13 Errata to Simcoe Expert Report, GOOG-AT-MDL-C-000020467
12. 2024.01.13 Errata to Weintraub Expert Report, GOOG-AT-MDL-C-000020471
13. 2024.01.23 Chevalier Expert Report, GOOG-AT-MDL-C-000020474
14. 2024.01.23 Ferrante Expert Report, GOOG-AT-MDL-C-000020714
15. 2024.01.23 Ghose Expert Report, GOOG-AT-MDL-C-000020767
16. 2024.01.23 Israel Expert Report, GOOG-AT-MDL-C-000021036
17. 2024.01.23 Milgrom Expert Report, GOOG-AT-MDL-C-000021794
18. 2024.01.23 Rinard Expert Report, GOOG-AT-MDL-C-000022191
19. 2024.01.23 Shirky Expert Report, GOOG-AT-MDL-C-000022229
20. 2024.01.23 Simonson Expert Report, GOOG-AT-MDL-C-000022290
21. 2024.01.23 Skinner Expert Report, GOOG-AT-MDL-C-000022948
22. 2024.02.13 Expert Rebuttal Report of Adoria Lim, GOOG-AT-MDL-C-000023002
23. 2024.02.13 Expert Rebuttal Report of Gabriel Weintraub, GOOG-AT-MDL-C-000023226
24. 2024.02.13 Expert Rebuttal Report of Kenneth Wilbur, GOOG-AT-MDL-C-000023322
25. 2024.02.13 Expert Rebuttal Report of R. Ravi, GOOG-AT-MDL-C-000023435
26. 2024.02.13 Expert Rebuttal Report of Robin S. Lee, GOOG-AT-MDL-C-000023516
27. 2024.02.13 Expert Rebuttal Report of Rosa Abrantes-Metz, GOOG-AT-MDL-C-000023887
28. 2024.02.13 Expert Rebuttal Report of Timothy Simcoe, GOOG-AT-MDL-C-000024064
29. 2024.02.13 Expert Rebuttal Report of Wayne Hoyer, GOOG-AT-MDL-C-000024138
30. 2024.02.13 Expert Rebuttal Report of Wenke Lee, GOOG-AT-MDL-C-000024270

31. 2024.02.16 Errata to Ravi Rebuttal Report, GOOG-AT-MDL-C-000024387
32. 2024.02.20 Errata to Simcoe Rebuttal Report, GOOG-AT-MDL-C-000024389
33. 2024.02.23 Errata to Weintraub Rebuttal Report, GOOG-AT-MDL-C-000024390
34. 2024.02.23 Supplemental Errata to Weintraub Expert Report, GOOG-AT-MDL-C-000024391
35. 2024.02.24 Errata to Wilbur Rebuttal Report, GOOG-AT-MDL-C-000024392
36. 2024.02.26 Errata to Hoyer Rebuttal Report, GOOG-AT-MDL-C-000024397
37. 2024.02.28 Errata to Abrantes-Metz Rebuttal Report, GOOG-AT-MDL-C-000024399
38. 2024.03.04 Expert Supplemental Report of Robin S. Lee, GOOG-AT-MDL-C-000024403
39. 2024.03.08 Consolidated Errata to Lee Rebuttal Report, GOOG-AT-MDL-C-000024436
40. 2024.01.13 Expert Report of Weintraub Errata, GOOG-AT-MDL-C-000040965
41. 2024.01.13 Expert Report of Simcoe Errata, GOOG-AT-MDL-C-000040961
42. 2024.01.13 Expert Report of Respass Errata_with Figure Errata_Redacted, GOOG-AT-MDL-C-000040934
43. 2024.01.13 Expert Report of R Ravi Errata, GOOG-AT-MDL-C-000040931
44. 2024.01.13 Expert Report of Abrantes-Metz Errata, GOOG-AT-MDL-C-000040929
45. 2024.03.08 Consolidated Errata to Lee Rebuttal Report, GOOG-AT-MDL-C-000040926
46. 2024.03.04 Expert Supplemental Report of Robin S. Lee, PhD, GOOG-AT-MDL-C-000040893
47. 2024.02.28 Rebuttal Report Errata of Rosa Abrantes-Metz Signed, GOOG-AT-MDL-C-000040889
48. 2024.02.25 Expert Rebuttal Report of Hoyer Errata, GOOG-AT-MDL-C-000040887
49. 2024.02.24 Wilbur Rebuttal Errata, GOOG-AT-MDL-C-000040882
50. 2024.02.23 Weintraub Rebuttal Report Errata, GOOG-AT-MDL-C-000040881
51. 2024.02.23 Expert Report of Weintraub Supplemental Errata, GOOG-AT-MDL-C-000040880
52. 2024.02.20 Errata to Simcoe Rebuttal Report, GOOG-AT-MDL-C-000040879
53. 2024.02.16 Errata to Ravi Rebuttal Report (Highly Confidential), GOOG-AT-MDL-C-000040877
54. 2024.02.13 Rebuttal Report of Rosa Abrantes-Metz, GOOG-AT-MDL-C-000040700
55. 2024.02.13 Expert Report of Wenke Lee, GOOG-AT-MDL-C-000040583
56. 2024.02.13 Expert Rebuttal Report of Wayne Hoyer, GOOG-AT-MDL-C-000040451
57. 2024.02.13 Expert Rebuttal Report of Timothy Simcoe_Redacted, GOOG-AT-MDL-C-000040377
58. 2024.02.13 Expert Rebuttal Report of Robin S. Lee_Redacted, GOOG-AT-MDL-C-000040006
59. 2024.02.13 Expert Rebuttal Report of R Ravi, GOOG-AT-MDL-C-000039925
60. 2024.02.13 Expert Rebuttal Report of Kenneth Wilbur_Redacted, GOOG-AT-MDL-C-000039812

61. 2024.02.13 Expert Rebuttal Report of Gabriel Weintraub_Redacted, GOOG-AT-MDL-C-000039716
62. 2024.02.13 Expert Rebuttal Report of Adoria Lim_Redacted, GOOG-AT-MDL-C-000039492
63. 2024.01.23 Expert Report of William Clay Shirky, GOOG-AT-MDL-C-000039431
64. 2024.01.23 Expert Report of Paul R. Milgrom, GOOG-AT-MDL-C-000039034
65. 2024.01.23 Expert Report of Martin C. Rinard, GOOG-AT-MDL-C-000038996
66. 2024.01.23 Expert Report of Mark A. Israel_Redacted, GOOG-AT-MDL-C-000038238
67. 2024.01.23 Expert Report of Judith A. Chevalier_Redacted, GOOG-AT-MDL-C-000037998
68. 2024.01.23 Expert Report of Itamar Simonson, GOOG-AT-MDL-C-000037340
69. 2024.01.23 Expert Report of Douglas Skinner, GOOG-AT-MDL-C-000037286
70. 2024.01.23 Expert Report of Anthony J. Ferrante, GOOG-AT-MDL-C-000037233
71. 2024.01.23 Expert Report of Anindya Ghose_Redacted, GOOG-AT-MDL-C-000036954
72. 2023.12.22 Expert Report of Timothy Simcoe_Redacted, GOOG-AT-MDL-C-000036793
73. 2023.12.22 Expert Report of Thomas Respass_Redacted, GOOG-AT-MDL-C-000036625
74. 2023.12.22 Expert Report of Rosa Abrantes-Metz_Redacted, GOOG-AT-MDL-C-000036305
75. 2023.12.22 Expert Report of Robin S. Lee, PhD_Redacted, GOOG-AT-MDL-C-000035792
76. 2023.12.22 Expert Report of R Ravi_Redacted, GOOG-AT-MDL-C-000035536
77. 2023.12.22 Expert Report of Gabriel Weintraub_Redacted, GOOG-AT-MDL-C-000035253

B. Facebook Boycott event analysis

419. For the Facebook Boycott analysis in my Opening Report, I rely on a New York Times report to collect the list of firms that announced that they would join the Facebook Boycott starting from July 2020. This article shows each firm's estimated ad spends in 2019 in the United States, based on the statistics from the advertising analytics platform Pathmatics.^{740,741} Most firms announced that they would stop their

⁷⁴⁰ The New York Times. "CVS, Dunkin', Lego: The Brands Pulling Ads From Facebook Over Hate Speech" (Updated July 7, 2020). Accessed on May 9, 2024. <https://www.nytimes.com/2020/06/26/business/media/Facebook-advertising-boycott.html>

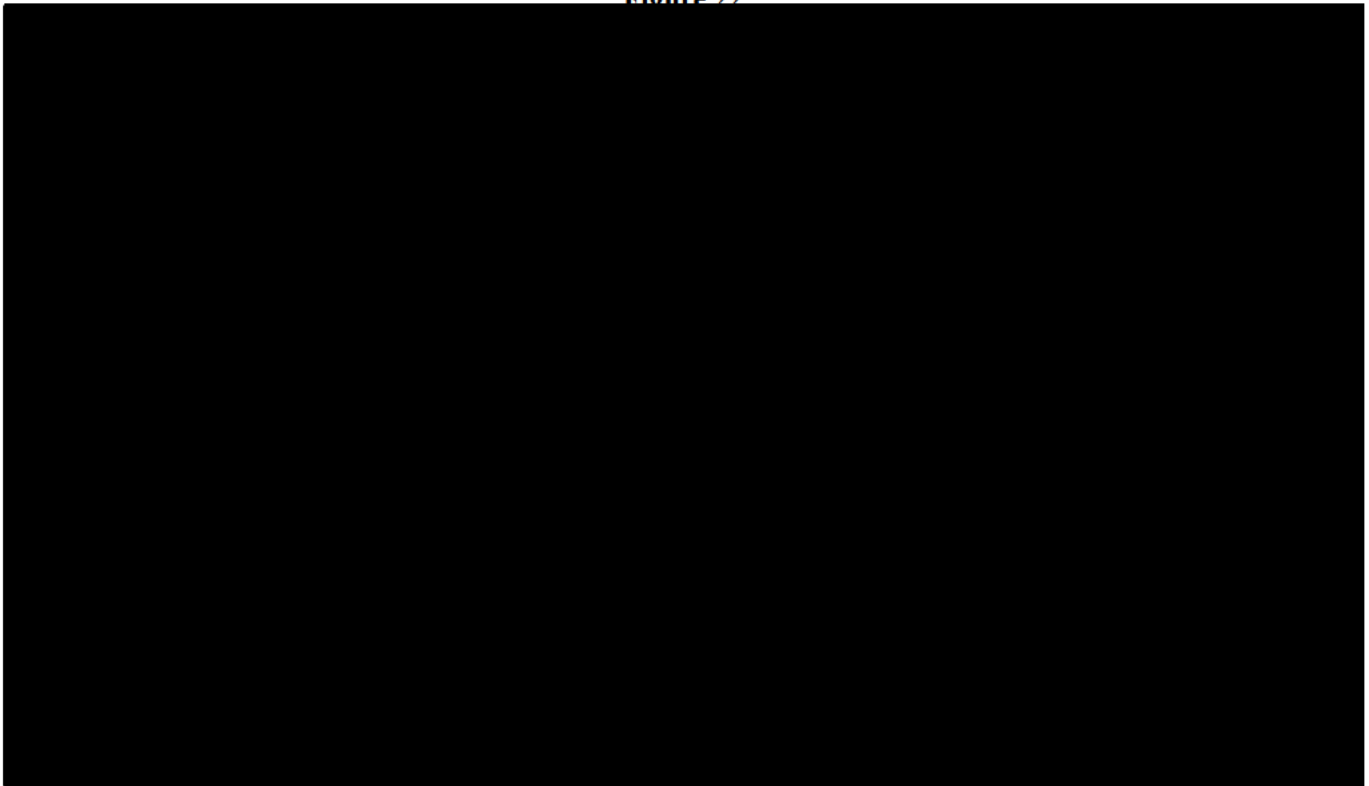
⁷⁴¹ Note that Pathmatics extrapolates ad spend from a sample of digital ads collected from the web, so a firm's estimated ad spend is smaller than its actual advertising costs in the financial report (e.g., 10-K), which also includes offline ad spends and consumer promotion expense. Pathmatics - Data Collection. "How We Collect Our Data" (Undated). Accessed on June 4, 2024. <https://pathmatics.zendesk.com/hc/en-us/articles/360026316391-How-We-Collect-Our-Data> ("We sample each site based on traffic to keep sampling rates low enough for minimal impact on the advertising ecosystem. This ensures we capture a representative sample of actual ad activity while remaining respectful web citizens. Actual numbers vary, but data aggregation ranges from 100 times per day for the smallest sites to a couple thousand times per day for the largest sites. Our sampling frequency enables us to capture new advertisers and campaigns.").

advertising on Facebook and Instagram in July 2020, and some firms would also extend their suspension to other social media platforms like Twitter or extend the suspension period to August, or the end of 2020.

420. I first show the overall ad spending pattern of all participating firms in the NYT list with ad spend of more than \$[REDACTED] million in 2019 in the US. There are 38 firms in total, [REDACTED] of which can be matched to the RFP-20 data. Among these [REDACTED] firms, [REDACTED] firms purchased impressions on Google Ads and [REDACTED] firms purchased impressions on DV360.⁷⁴²

421. To avoid the substitution pattern being driven by the composition change of firms, I restrict my analysis to the [REDACTED] firms with Google Ads spend data available in 2020 and 2021, and my aforementioned conclusions remain unchanged.

Figure 22



⁷⁴² Note that the ad spend data for some firms is not available for the whole period from January 2019 to December 2021. Among the [REDACTED] firms with ad spend on Google Ads, data for [REDACTED] is available only in 2021, while data for [REDACTED] is only available in 2020. Data for four other firms ([REDACTED]) is available for 2020 and 2021, but not 2019.

⁷⁴³ To generate this graph, I selected [REDACTED] firms from the NYT report based on the following rules: (1) The firm has Google ad spends showing in the RFP-20 data; (2) The firm has more than [REDACTED] ad spending (or unknown) based on the estimates of Pathmatics; (3) The firm has RFP-20 data available for all months in 2020 and 2021. I matched each firm to its advertiser customer name in the RFP-20 data, then aggregated their ad spends for each month. These [REDACTED] firms are [REDACTED]

422. Similarly, for DV360, among the [REDACTED] participating firms, data for 2020 and 2021 are available for only [REDACTED] of them. I present below the graph of aggregated ad spend on DV360 for these [REDACTED] firms, and as can be seen, the patterns are similar to the graph of the full sample and my conclusions hold.

Figure 23



423. Thus, for both Google Ads and DV360, it is evident that there was no significant substitution between social media ads and display ads.

424. Professor Baye levels three criticisms at my Facebook Boycott analysis for market definition. First, he claims that “participants self-selected into the boycott, they were not randomly or quasi-randomly selected, which is a condition for a natural experiment in economics”⁷⁴⁵ The historical event leading to the boycott is an exogenous event from the perspective of the hypothesis of interest – i.e., it is unrelated to the determinants of the demand for display advertising. It is not relevant if advertisers, once affected by this random event, choose to participate in the boycott or not because, as I discuss below, the ideal control for a given advertiser after the shock is that same advertiser in the pre-shock period.

⁷⁴⁴ To generate this graph, I selected 12 firms from the NYT report based on the following rules: (1) The firm has DV360 spends showing in the RFP-20 data; (2) The firm has more than [REDACTED] ad spending (or unknown) based on the estimates of Pathmatics; (3) The firm has RFP-20 data available for all months in 2020 and 2021. I matched each firm to its advertiser customer name in the RFP-20 data, then aggregated their ad spends for each month. These [REDACTED] firms are [REDACTED]

⁷⁴⁵ Baye Report, ¶260.

425. Second, Professor Baye opines that I did not “evaluate a control group from which to isolate any effect of the boycott.”⁷⁴⁶ My analysis follows a “pre-post design,” commonly employed in economic event studies literature.⁷⁴⁷ In this type of analysis, each advertiser’s pre-boycott demand serves as the control for their post-boycott demand. The event’s randomness and pre-post design allow for an unbiased assessment of its impact on demand across channels for select advertisers. This provides valuable insights into their substitution patterns.⁷⁴⁸

426. Third, Professor Baye claims that I “selected a handpicked sample of these self-selected firms, further contaminating any claim to this representing a ‘natural experiment;’”⁷⁴⁹ This is, at the very least, contradicting the fact that Professor Baye cites the Facebook Boycott in other instances of his report to support that there is what he incorrectly calls “multi-homing.”⁷⁵⁰ Professor Baye relies on anecdotal evidence from one *Wall Street Journal* article where advertiser Eileen Fisher says it would increase spending on “current tactics”⁷⁵¹ in response to the Facebook Boycott. He also relies on a Google document, which notes that, in response to the Facebook Boycott, “Nike shifted the investment that it was putting into Facebook and Instagram and diverted it to DBM and search.”⁷⁵² In contrast with Professor Baye’s approach to rely on anecdotal evidence, I analyze Google data on advertiser spending. Professor Baye had this data at his disposal but did not use it to show that the several examples I provided as well as the results for the average effect across *all advertisers who participated in the boycott* identified in Google data were biased.

427. Moreover, Professor Baye claims that analyzing the impact on substitution towards display advertising due to a transitory decrease in demand for a large social media or retailer platform for advertising does not provide information about whether advertisers would substitute to social media or retailer ads in the event of a SSNIP in display advertising.⁷⁵³ There is no reason to believe switching is not symmetric. Indeed, in other parts of his report, Professor Baye notes that advertisers use each type of advertising up to the point where marginal ROI is equalized across each type and that advertisers respond

⁷⁴⁶ Baye Report, ¶260.

⁷⁴⁷ “The event study is probably the oldest and simplest causal inference research design. It predates experiments. It predates statistics. It probably predates human language. It might predate humans. The idea is this: at a certain time, an event occurred, leading a treatment to be put into place at that time. Whatever changed from before the event to after is the effect of that treatment.” Huntington-Klein, Nick. “The effect: An introduction to research design and causality.” Chapman and Hall/CRC (2021).

⁷⁴⁸ This method is very close to diversion ratio which is a measure of how customer substitute between firm. “The diversion ratio is the fraction of unit sales lost by the first product due to a change in terms, such as an increase in its price, that would be diverted to the second product. The higher the diversion ratio between two products made by different firms, the stronger the competition between them.” U.S. Department of Justice and the Federal Trade Commission. “Merger Guidelines.” (2023).

⁷⁴⁹ Baye Report, ¶260.

⁷⁵⁰ See Section II.C. the proper definition of multi-homing in the economics literature.

⁷⁵¹ Baye Report, footnote 439.

⁷⁵² Baye Report, footnote 440.

⁷⁵³ Baye Report, ¶261.

to a shift in marginal ROI equalization by trimming away budget from ads subject to the price increase and toward ads that were not affected by the price increase.^{754 755} This suggests two-way switching depending on ROI.

428. Professor Baye also performs a “back-of-the-envelope” calculation using Figure 6 in my Opening Report where I present the aggregate effect of the Facebook Boycott on Google Ads spending of [REDACTED] firms participating in the boycott which I could identify in the Google data based on a public list of participants.⁷⁵⁶ In his calculation, Professor Baye shows little regard for the rigorous causal inference criteria for natural experiments he uses to attack my analysis. Professor Baye calculates the difference in advertisers' expenses on display ads between two periods: January-June 2020 and January-June 2021.⁷⁵⁷ However, this approach overlooks the months immediately following the event (July 2020-January 2021), which are crucial for understanding the event's impact. To accurately assess the effect of the event, it is essential to focus on the months directly before and after it occurred. As you move further away from the event, the estimates become less reliable and less relevant to understanding the event's true impact.

429. Figure 6 in my Opening Report demonstrates that there is not discontinuity in the pre-existing trend of open web display advertising spend for advertisers participating in the Facebook Boycott. This is sufficient to conclude that the boycott did not result in substitution to open web display as econometricians would not attempt to find a statistically significant effect without crude graphical evidence showing such discontinuity in the time series or panel data.⁷⁵⁸ To formally estimate the point estimate that summarizes statistical conclusions in my report, I employ the following regression model:

$$y_{it} = \alpha_i + \beta t + \gamma_m Month_t + B_{it} + \epsilon_{it}$$

430. This regression model accounts for the pre-existing trend in the growth of display ad spend as well as seasonality in the data (γ_m is the coefficients for the effect of each month of the year, m) and advertiser specific characteristics (α_i is the fixed effect for advertiser, i). The dataset is monthly and spans from

⁷⁵⁴ Baye Report, Footnote 227.

⁷⁵⁵ I also note that the district court in the Search case accepted analyses from advertiser budget allocation following the Facebook boycott as evidence of substitution between advertising types., *see United States v. Google*. No. 20-cv-3010, 2024, page 175.

⁷⁵⁶ Gans Opening Report, Footnote 244.

⁷⁵⁷ Baye Report, Footnote 352.

⁷⁵⁸ Angrist Joshua, and Jorn-Steffen Pischke. *Mostly Harmless Econometrics*: Chapter 5.2, Princeton University Press, NJ (2008): 169-182.

January 2019 to January 2021. B is the indicator for boycott periods and is equal to one between July 2020 and December 2020.

431. To ensure robustness, I estimate two variations of the model:

- a. I normalize the outcome by dividing it to its initial value (January 2019).
- b. I use the logarithm of the outcome.

432. Across the two models, I find no significant effect of the boycott on the spending of selected advertisers on display ads.

Table 8
Regression coefficient results across specifications⁷⁵⁹

Model	Coef.	Std	Z	P-value	[0.025	0.975]
a	-0.07	0.83	-0.08	0.93	-1.67	1.55
b	0.1	0.16	0.63	0.53	-0.21	0.41

C. Market shares

1. Professor Baye's calculations of AdX and Google Ads market shares are incorrect

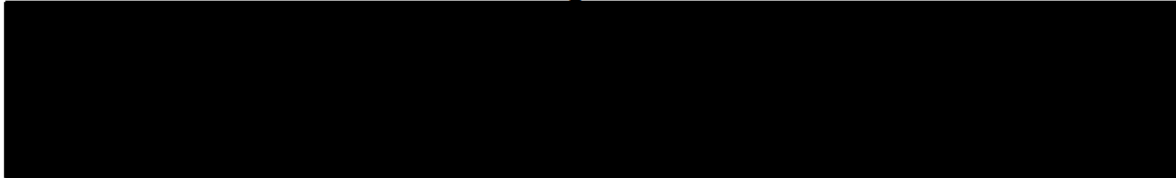
433. Professor Baye presents his conclusions with respect to AdX's market share in Exhibit 20 of his report. Professor Baye first accepts the market definition I establish in my Opening Report and presents my estimates for AdX's market share in row [A] of his Exhibit 20 reproduced in Figure 24 below. Professor Baye then performs three separate calculations (rows [B], [C] and [D] of the table in Exhibit 20) in which he combines my original estimates to arrive at his estimate of AdX's market share in the relevant ad exchange market for open web display.

⁷⁵⁹ Source: RFP-20 data. To generate this graph, I selected [REDACTED] firms from the NYT report which has RFP-20 data available for all months in 2020 and 2021. I matched each firm to its advertiser_customer_name in the RFP-20 data, then aggregated their ad spends in Google ads product for each month. Error term, ε_{it} , is clustered at advertiser level. The time period, t , represents each month-year, spanning from -18 (January 2019) to 17 (December 2021), with July 2020 as the reference point ($t=0$).

AdX's share of DFP impressions is representative of AdX's share of overall display impressions in the US in 2019.”⁷⁶¹

436. Figure 25 below presents the data documentation provided by Google on the variables “AdX_Buyer_Category” and “Transaction_Type” which I use to define the relevant set of transactions to consider for ad exchange market share calculations described in the previous paragraph.

Figure 25



437. Professor Baye's calculation in row [B] modifies my calculation described above by excluding instances in which “AdX_Buyer_Category” is not equal to “Non-Adx or Unmatched” (my definition of AdX transactions) and he modifies “Transaction_Type” is equal to “EBDA” from the accounting of AdX transactions. Professor Baye does not provide any justification to support his choice to do so.

b) Calculations in Exhibit 20, row [C] and [D] in Professor Baye's report

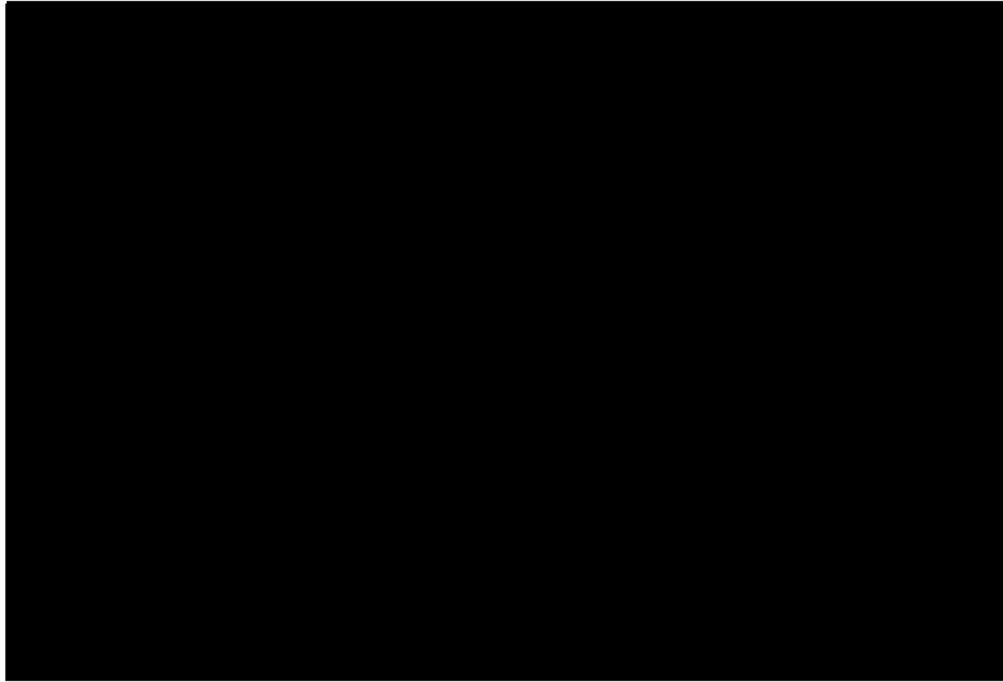
438. The premise behind Professor Baye's calculations in rows [C] and [D] of Exhibit 20 in his report is that DFP somehow does not serve over █% of impressions from the relevant ad exchange market even though it had a market of around █% and growing in terms of impressions served in 2017.⁷⁶³ Figure 26 below reproduces Figure 65 in Professor Baye's report. Professor Baye uses this figure to demonstrate that DFP data does not account for a substantial share of U.S. impressions transacted by non-Google exchanges. For example, Professor Baye estimates that DFP does not serve █% of Microsoft's exchange (Xandr) impressions.

⁷⁶¹ Professor Baye overlooks this fact in multiple instances across his report claiming that my calculations are restricted to DFP's share of the ad serving market.

⁷⁶² Source: “2023.04.17 Transmittal Letter re Data Production,” (April 17, 2023).

⁷⁶³ Gans Opening Report, ¶353. 2017 is last year for which this metric was found in Google documents due to the reasons I discuss in my report.

Figure 26



439. Professor Baye's incorrect premise is based on his misunderstanding of the data I used for my calculations and how third-party exchange transactions are recorded by DFP in spite of wide documentation.

440. Google defines the universe of DFP indirect transactions as the sum of the following line item types: [REDACTED]⁷⁶⁵ Publishers can also set up third-party ad exchanges as Open Bidding partners since 2018.⁷⁶⁶

441. DFP publishers can set up third-party exchanges as partners using a variety of line items (also called reservations).⁷⁶⁷ Commonly, publishers use non-guaranteed or "remnant" line items (Price Priority) to connect to third-party ad exchanges.⁷⁶⁸ Because publishers can connect to third-party ad exchanges using remnant line items not only via Header Bidding, but also directly, DFP transactions involving third-party exchanges are not limited to Header Bidding and Open Bidding transactions. The data I used to calculate

⁷⁶⁴ Baye Report, Figure 65.

⁷⁶⁵ GOOG-TEX-00971726 at -736. "Header Bidding Observatory #2" (May 2017). Internal Google presentation detailing Header Bidding adoption. This definition precedes the launch of Open Bidding which is part of the definition thereafter.

⁷⁶⁶ Google Ad Manager Help. "Line item types and priorities" (Undated). Accessed on August 28, 2024. <https://support.google.com/admanager/answer/177279?hl=en>

⁷⁶⁷ Google Ad Manager Help. "Introduction to Open Bidding. Invite trusted third-party exchanges to compete for your inventory" (undated). Accessed on August 28, 2024. <https://support.google.com/admanager/answer/7128453?hl=en>

⁷⁶⁸ GOOG-AT-MDL-C-000012795 at -803.

AdX's market share between 2018 and 2023 includes all of these transactions and is not limited to Header Bidding and Open Bidding transactions.⁷⁶⁹

442. To estimate the share of impressions in the relevant ad exchange market that DFP does not serve, Professor Baye compares the volume of transactions in DFP data that can be attributed to a given exchange and the impression volume data provided by the third-party ad exchange throughout the period for which the data is available. He performs this comparison in two steps.

443. Professor Baye first constructs a panel of third-party exchanges' transactions using Google data (Google third-party exchanges panel, "GP"). He combines DFP reservations data, which contains impressions transacted by exchanges via Header Bidding and different line items, and AdX submission data, which contain Exchange Bidding transactions.⁷⁷⁰ Both datasets span 2014-2023 and Professor Baye compiles this data for US publishers.

444. Second, Professor Baye constructs a panel of impression volume from third-party ad exchanges using data directly produced by these exchanges (third-party exchange data panel, "3PP"). Professor Baye's panel includes the following ad exchanges: Microsoft (Xandr), Magnite (Rubicon), Yahoo, PubMatic, Index Exchange, OpenX, Sovrn, Yieldmo and Sharethrough. These exchanges have produced data for the respective time periods in parenthesis noted below Figure 65 in Professor Baye's report.

445. Professor Baye sums the volume of impressions observed across third-party exchanges and the sample years using each of the two panels described above. He then creates two multipliers for the market share of third-party exchanges that produced data. The first multiplier (Baye multiplier "BM1"), for a given year, is the ratio of the sum of impression volume for these ad exchanges combined using the third-party exchange data panel over the sum of their impression volume on DFP through Header Bidding and Open Bidding. The second multiplier (Baye multiplier "BM2") is an estimate of these exchanges' combined share of Header Bidding and Open Bidding overall transactions.⁷⁷¹ Professor Baye's BM1 multiplier ranges from 3 to 5.2 between 2018 and 2022.

446. In row [C] of Exhibit 20, Professor Baye calculates the AdX market share as follows:

$$\text{Adx share row}[C] \text{ in year } i = \frac{\text{Gans AdX impression volume}_i - \text{AdX impressions removed by Baye in row}[B]_i}{\text{Gans total indirect transactions volume}_i + (BM1 - 1) * BM2 * \text{sum of impressions in } 3PP_i}$$

⁷⁶⁹ See GOOG-AT-MDL-C-000012771 at -771 and 772.

⁷⁷⁰ Google Digital Advertising Antitrust Litigation, No. 1:21-md-03010 (PKC), May 30, 2023, Letter from D. Pearl to M. Mao and W. Noss.

⁷⁷¹ See Baye expert production file "Third Party Exchanges Charts.do" code lines 327 to 344. Note that this multiplier is calculated before the data is limited to the 2018-2022 time frame in line 351.

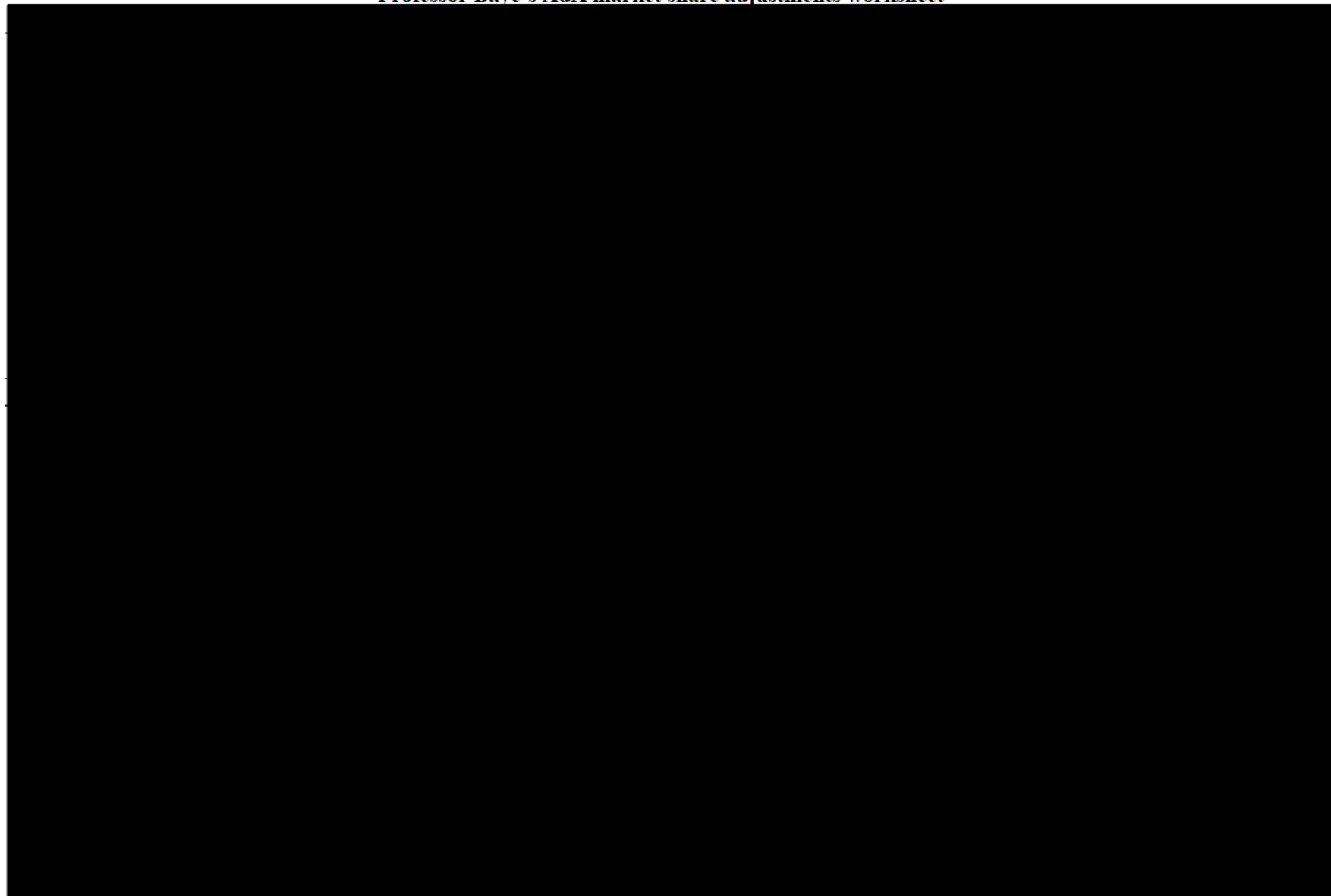
$$= \frac{\text{Baye AdX volume}_i}{\text{Gans total indirect transactions volume}_i + (BM1 - 1) * BM2 * \text{sum of impressions in } 3PP_i}$$

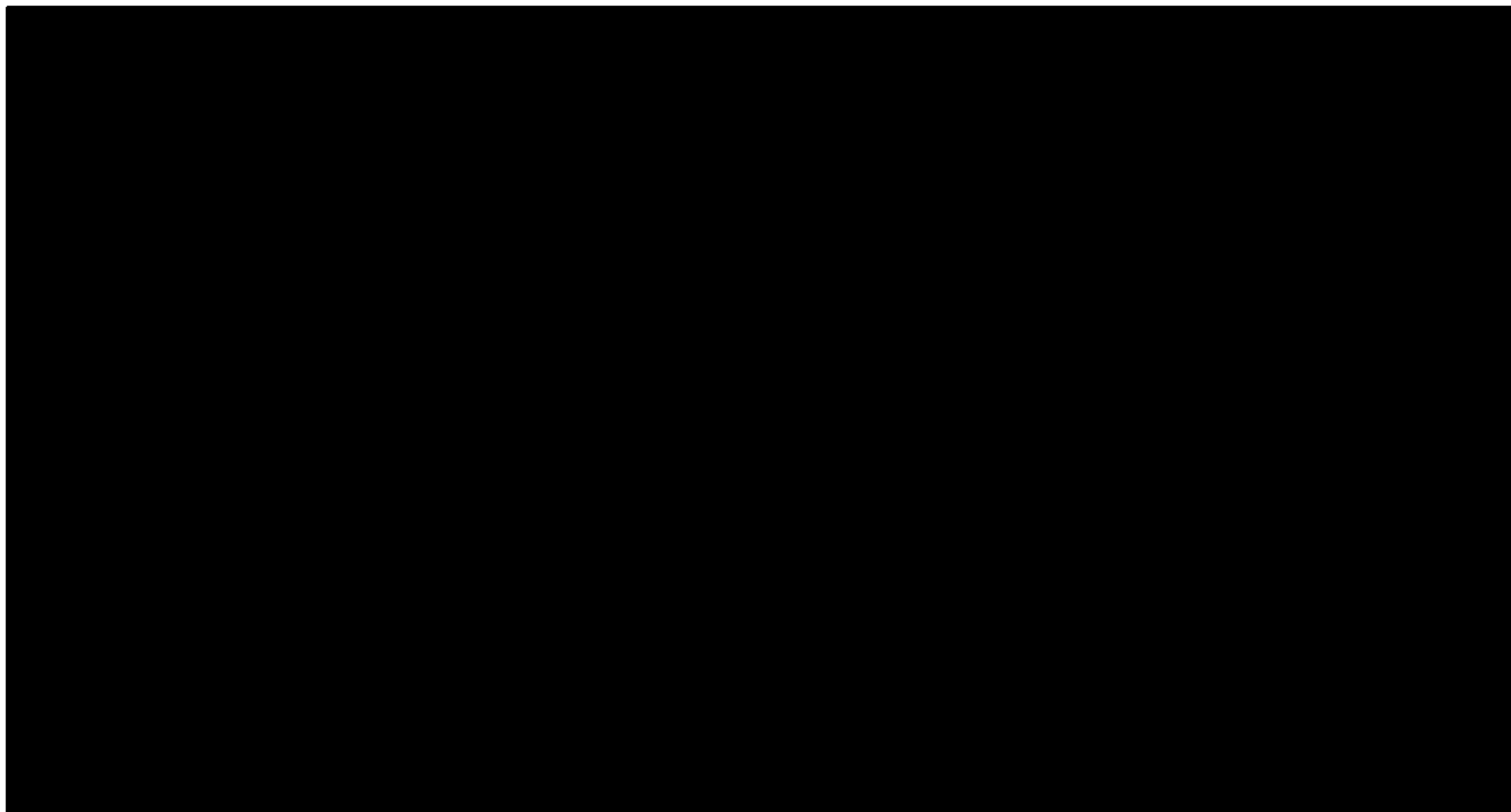
447. In row [D], he applies he calculates:

Adx share row[D] in year i =

$$\frac{\text{Baye AdX volume}_i}{\text{Baye AdX volume}_i + BM1 * (\text{Gans total indirect transactions volume}_i - \text{Baye AdX volume}_i)}$$

Table 9
Professor Baye's AdX market share adjustments worksheet





448. Table 9 presents Professor Baye's worksheet for adjusting my AdX market share calculations based on the approach described above. Setting aside Professor Baye's unjustified discount to AdX transactions applied to row [B] of his Exhibit 20, he makes one key mistake leading to double-counting of non-Google ad exchanges' transactions. The data I used for my market share calculations includes all indirect transactions served by DFP, including but not limited to, Header Bidding and Open Bidding data.⁷⁷² The totality of DFP indirect impressions includes all transactions by third-party exchanges served by DFP. Moreover, I accounted for the small minority of impressions that may have been served by non-Google ad servers as explained in footnote 430 of my Opening Report.

449. Professor Baye arrives at the erroneous conclusion that the DFP data I use does not encompass all relevant transactions by using a different DFP dataset with similar variables but a longer time span. Even though these two datasets provide the full scope of impressions served by DFP, neither allows us to see the name of the winning ad exchange for several reservation types. This is true even after Google's multi-year effort to develop a process to identify Header Bidding transactions. The fact that the ad exchange's name cannot be verified for many transactions results in Professor Baye not being able to match the volumes across the two panels he created at an ad exchange level.

450. First, simple algebra shows that Professor Baye's premise that DFP does not account for such a substantial share of these exchanges' transactions in spite of its near █████% market share of impressions is evidently incorrect.⁷⁷³

451. Second, Professor Baye's figures reflect the known fact that DFP, until 2018, did not have a reliable process to identify impressions transacted by exchanges conducting Header Bidding. This fact is widely documented in Google's internal documents and data documentation provided for this case.⁷⁷⁴ More

⁷⁷² See footnote 428 in Gans Opening Report. ("To capture indirect impressions, the column "reservation_type" is filtered to be equal to "Unknown", "Bulk", "Remnant" or "Ad Exchange."")

⁷⁷³ If DFP serves, conservatively, █████% of web display impressions, only █████% of impressions transacted by ad exchanges in the relevant market may be unaccounted for in DFP data. Professor Baye presents proportions much higher than █████% in his Figure 65.

⁷⁷⁴ The "Header Bidding Monitor" data begins in June 2018. "2023.04.17 Transmittal Letter re Data Production," (April 17, 2023). "The '2021.11.18 HB Monitor Data' folder contains Header Bidding Monitor data for the North American region from June 2018 to December 2020." The difficulty of identifying Header Bidding is documented by Google in its "2023.04.17 Transmittal Letter re Data Production," (April 17, 2023). "While no piece of information by itself definitively identifies header bidding usage, Google developed a method that relies on two signals to identify header bidding usage with a sufficient degree of accuracy for internal analysis [...] Because both the degeneracy condition and the key name condition may fail to identify some instances of header bidding (e.g., when fewer than 70 line items are used, when a firm unknown to Google employs header bidding), Header Bidding Monitor is more likely to understate the true incidence of header bidding than to overstate it."

generally, DFP data does not record the ad exchange or DSP name for transactions filled by any reservation type.⁷⁷⁵

452. Professor Baye's calculation heavily relies on this measurement problem. The problem is particularly aggravated by his choice to sum impressions across years which leads him to include years for which DFP could not attribute Header Bidding impressions to the corresponding ad exchange (before 2018). Professor Baye's Figures 66 to 74 demonstrate that clearly as, after 2018, the gap between each exchange's data and the DFP impressions matched to their name is suddenly reduced. After that, the smaller gap between these two data sources is explained by transactions filled via reservations.

453. Professor Baye notes that I calculate AdX market share in 2022, which fell to [REDACTED] percent, but do not include in the report.⁷⁷⁶ The reason is that the Header Bidding Monitor data only allows me to track the impression until September 2022. Instead, Professor Baye reports AdX market share in 2022 based on the data from January to September, which is biased due to the fluctuations of AdX shares across months.

454. Professor Baye calculates the ratio of impressions from rival exchanges with observable data to the number of impressions computed through Header Bidding (HB) and Open Bidding (OB) for selected exchanges. He then uses this ratio to extrapolate the number of impressions for all third-party exchanges through DFP by multiplying this ratio by the number of impressions through HB and OB for all third-party exchanges. In sum, there are multiple issues with the way the ratio is computed and then used for extrapolation.

455. First, Professor Baye incorrectly attributes all DFP indirect impressions, except AdX, to HB and OB. According to Google data documentation,⁷⁷⁷ Header Bidding monitor data consists of AdX, HB, OB, and other Remnant DFP. Therefore, even with a correct ratio, he overestimates the number of HB and OB impressions for third-party exchanges in part C and D of Table 9.

456. Second, Professor Baye underestimates the number of HB and OB impressions for the selected exchanges in 2018 since data before June is unreliable. The total HB and OB impression volume he computes is [REDACTED] in 2018, whereas using the same approach and focusing only on data after June, the total HB and OB would be [REDACTED]. To fix this problem, one should focus on data after June for both observable data and HB and OB impressions to compute the ratio.

⁷⁷⁵ For example, the DOJ Google Ad Manager Log-level Data Submission simply logs "Reservation" as the advertiser_dsp name when the auction winner is a reservation bid whereas specific DSPs and exchanges are identified by name when the impression is transacted by AdX or Open Bidding.

⁷⁷⁶ Baye Report, footnote 461.

⁷⁷⁷ Google Digital Advertising Antitrust Litigation, No. 1:21-md-03010 (PKC), May 30, 2023, Letter from D. Pearl to M. Mao and W. Noss.

457. Even after addressing the two issues mentioned earlier, the implied share⁷⁷⁸ of DFP from Professor Baye's analysis remains lower than what Google claims in their documents for both Parts C and D of Professor Baye's calculation.⁷⁷⁹ This suggests that Professor Baye may have overestimated the total number of impressions for the selected exchanges using observable data, likely due to imperfect application of geographic and display ads filters.

c) Professor Baye's calculations of Google Ads' market share are plagued with the same errors present in his AdX market share calculations

458. Professor Baye's calculation of Google Ads' market share also has the issue of double counting the impressions from non-Google ad buying tools for small advertisers and underestimates Google Ads' market share.

459. I calculate Google Ads' market share by multiplying AdX's market share as the product of AdX's market share and Google Ads' share among ad-buying tools for small advertisers within AdX. Assuming AdX's market share is $[A]$, where $[X]$ impressions are from Google Ads and $[Y]$ from non-Google ad buying tools within AdX, and $[Z]$ impressions come from non-Google ad buying tools in other exchanges, $[A]$ is derived as $([X] + [Y]) / ([X] + [Y] + [Z])$ from the buy side.

460. Professor Baye opines that Google Ads' market share calculation should consider the total underlying volume of impressions sold by ad buying for small advertisers, including outside of AdX, resulting in a market share formula of: $[X] / ([X] + [Y] + [Z])$. And it simplifies to $[A] * [X] / ([X] + [Y])$ after rearranging the terms. As such, Professor Baye's calculation in the second row of the Exhibit 21 includes $[Z]$ into the denominator. However, Professor Baye omits that my market shares already accounted for these impressions because of the multiplication by $[A]$ I performed. Professor Baye's market share formula can be re-written as: $[A] * [X] / ([X] + [Y] + [Z])$. In this formula, the simultaneous inclusion of $[Z]$ in the denominator and the multiplication by $[A]$ result in double-counting of transactions outside of AdX. Therefore, his calculation is a flawed approach that incorrectly diminishes Google Ads' market share.

461. Professor Baye claims that my calculation does not include all ad buying tools used by small advertisers, yet he cannot provide a comprehensive list of these tools himself. Given the impracticality of identifying every ad buying tool for small advertisers, I focused on the top 20 tools in AdX based on impressions. These tools account for over █% of AdX impressions since 2014, reaching █% in 2020 and

⁷⁷⁸After extrapolating the number of impressions for third-party exchanges, we now have the total number of impressions both through DFP and out of DFP. With this data, we can compute the share of DFP.

⁷⁷⁹Gans Report, ¶523.

2021.⁷⁸⁰ I then identified the tools within this top-20 list that are specifically for small advertisers and used them to define the relevant market. To maintain consistency across years, I considered only those tools that appeared in the top 20 each year. Professor Baye opines that this approach introduces inconsistency by including certain non-Google ad buying tools in some years but not others.⁷⁸¹ However, given the overwhelming share of impressions covered by these top 20 tools, incorporating additional tools outside of the list would not significantly alter the results.

2. Third-party data documentation

463. [REDACTED] [REDACTED]
[REDACTED]
[REDACTED] [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

465. [REDACTED]

⁷⁸¹ Baye Report, footnote 473.

782

466. [REDACTED]
[REDACTED]
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467. [REDACTED]
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[illegible]

469. [REDACTED]
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[illegible]

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506. [REDACTED]
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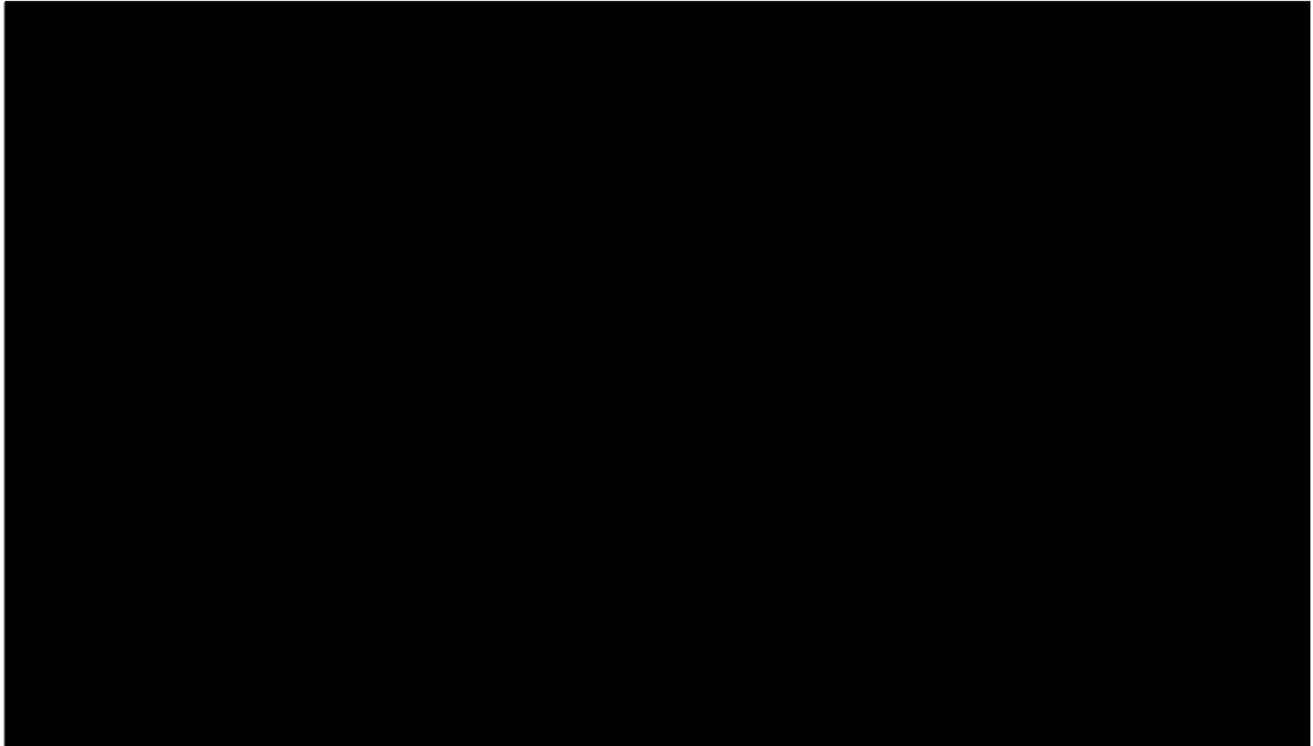
509. [REDACTED]
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[REDACTED]

3. Corrections to Professor Baye's market share calculations in his candidate fully integrated ad tech market

510. Row [A] shows Professor Baye's estimated market share for Google. Row [B] shows the shares if Professor Baye had properly included all of Google's display revenues using eMarketer data as available and as he did for the alleged competitors while keeping the denominator the same. Row [C] shows including Google Ads, DV360 and AdX (removing the overlap) non-video display ad spend in the numerator and only considering competitors who are fully integrated ad tech companies (only Xandr satisfies this criterion).⁸¹⁰ Row [D] is the same as row [C] but includes video inventory.

⁸¹⁰ I conservatively do not include DFP revenues in any of these calculations because Xandr ad server revenues are not available.

Table 10



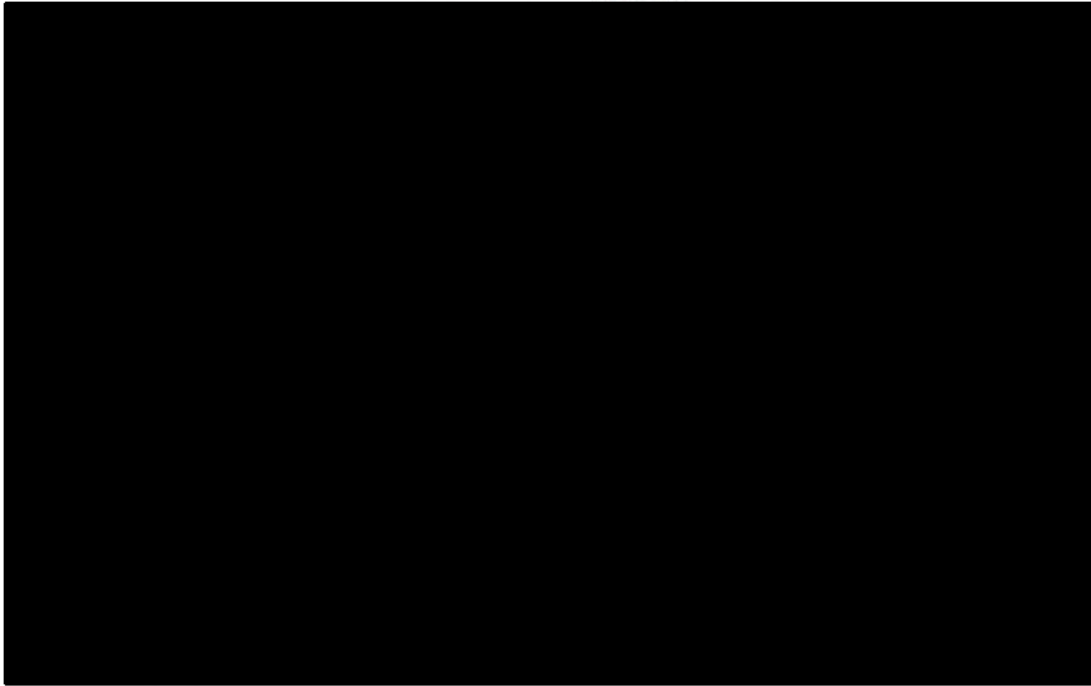
D. Corrections to Professor Baye's pricing analyses

1. DFP fees

511. Professor Baye presents the result of his calculation of the share of DFP publishers who are paying customers between January 2020 and June 2023 in Figure 45 of his report.

⁸¹¹ Sources: eMarketer, RFP-243 AdX Submission, RFP-243 Google Ads Submission, XBridge DV360, [REDACTED]. In row [B] I use the eMarketer data "Google display ad revenues" and "[REDACTED] display ad revenues" rows to estimate the total display ad spend in Baye's candidate market. In rows [C] and [D], I use Google and [REDACTED] produced data from each company's buy-side and exchange to estimate the total display ad spend in Baye's candidate market. To avoid double-counting Google Ads and DV360 wins in the AdX data, I filter out any revenue from impressions won by those tools.

Figure 27
Figure 45 in Baye Report⁸¹²



512. Professor Baye utilizes a dataset of monthly DFP billings by publisher and type of DFP fee. DFP has eight types of fees in the data.⁸¹³ Discounts are observed under the “discount fee” type. The data spans January 2014 to June 2023 and different countries.

513. The following table summarizes the average monthly DFP fees per customer from 2014 to 2022.

⁸¹² Baye Report, Figure 45.

⁸¹³ Data transfer fee, discount fee, full discount fee, minimum fee, monthly fee, served but discounted fee, serving fee and uplift fee. The discount fee is always negative.

Table 11
DFP fees per customer by type (2014-2022)⁸¹⁴



514. Professor Baye performs the calculation in Figure 45 of his report by first restricting the set of DFP billings to U.S. and the arbitrary time frame of January 2020 to June 2023. My review of the data shows that the set of publishers in the data [REDACTED] between 2017 and 2018 and again between 2018 and 2019 with [REDACTED]

[REDACTED] (see average impressions per network at Table 12).⁸¹⁵ Between 2020 and 2023, the time period chosen by Professor Baye, [REDACTED]

[REDACTED] (see the share of paying customers in Table 13). However, Table 13 shows that [REDACTED]

[REDACTED]

[REDACTED].

⁸¹⁴ DOJ RFP 57 DFP Fees Data is used for this analysis. It consists of files Bates numbered GOOG-AT-DOJ-DATA-000247050 to GOOG-AT-DOJ-DATA-000247053. Rows with the column “company_name” containing “youtube” are excluded. The column “pub_service_country_code” is restricted to “US.”

⁸¹⁵ [REDACTED]
[REDACTED] Table 12 below shows the composition change over time.

515. Professor Baye defines a “non-paying customer” as a publisher who paid zero total fees since 2020.⁸¹⁸ He then calculates the ratio between the sum of such non-paying customers in the January 2020 to June 2023 time frame and the total number of customers in this time frame.⁸¹⁹ The table below presents the correct calculation by year for the share of paying customers and the total DFP fees paid, averaged across paying customers. The results show that, Professor Baye greatly understates the share of DFP paying customers and that, [REDACTED]. With the appropriate corrections to the calculation and time period considered, Professor Baye would have found that [REDACTED] of DFP customers are paying customers instead of [REDACTED].⁸²⁰

⁸¹⁶ DOJ RFP 57 DFP Fees Data is used for this analysis. It consists of files Bates numbered GOOG-AT-DOJ-DATA-000247050 to GOOG-AT-DOJ-DATA-000247053. Rows with the column “company_name” containing “youtube” are excluded. The column “pub_service_country_code” is restricted to “US.” A customer is defined as “paying customer” if the total value of “billed_amount_usd_monthly_fx” in a year is positive.

⁸¹⁷

⁸¹⁸ Professor Baye does not account for the fact that the discount fee, which is always negative, represent the dollar amount of the fees waived for a set of units and should not be subtracted from the total fees. This is not quantitatively very important for this calculation. See 2024.02.15 Letter from Walter Noss In re: Google Digital Advertising Antitrust Litigation, No. 1:21-md-03010 (PKC); State of Texas, et al. v. Google LLC, No. 4:20-cv-00957-SDJ. (“Observations where fee_type is equal to “Discount_Fee” indicate units that are waived of fees. The dollar amount of the fees waived is indicated as a negative amount in the field billed_amount_usd_monthly_fx, and the volume of units waived of fees is indicated as a positive number of units in the field billed_units.”)

⁸¹⁹ As such, observations are a customer and month pair.

⁸²⁰ Baye Report, Figure 45.

Table 13

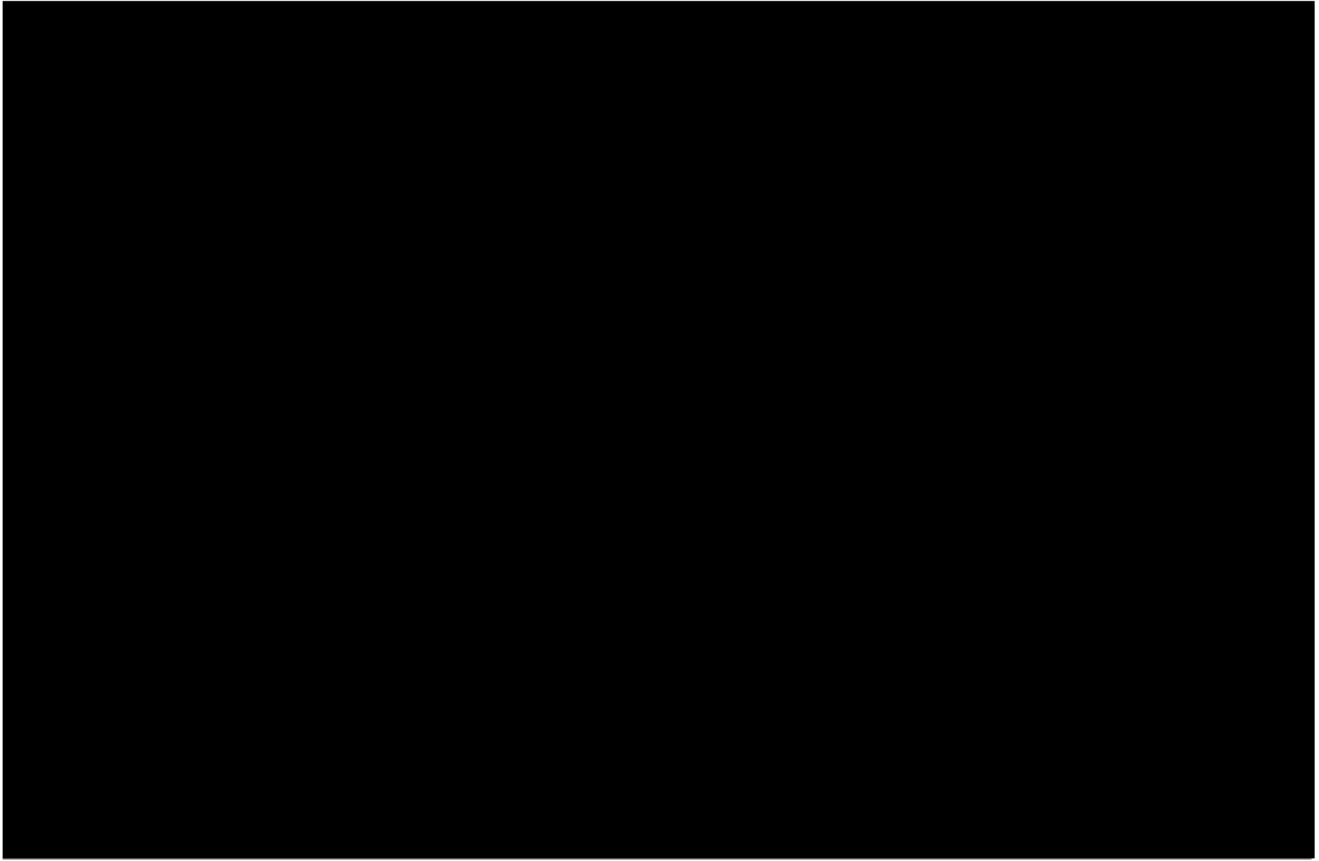
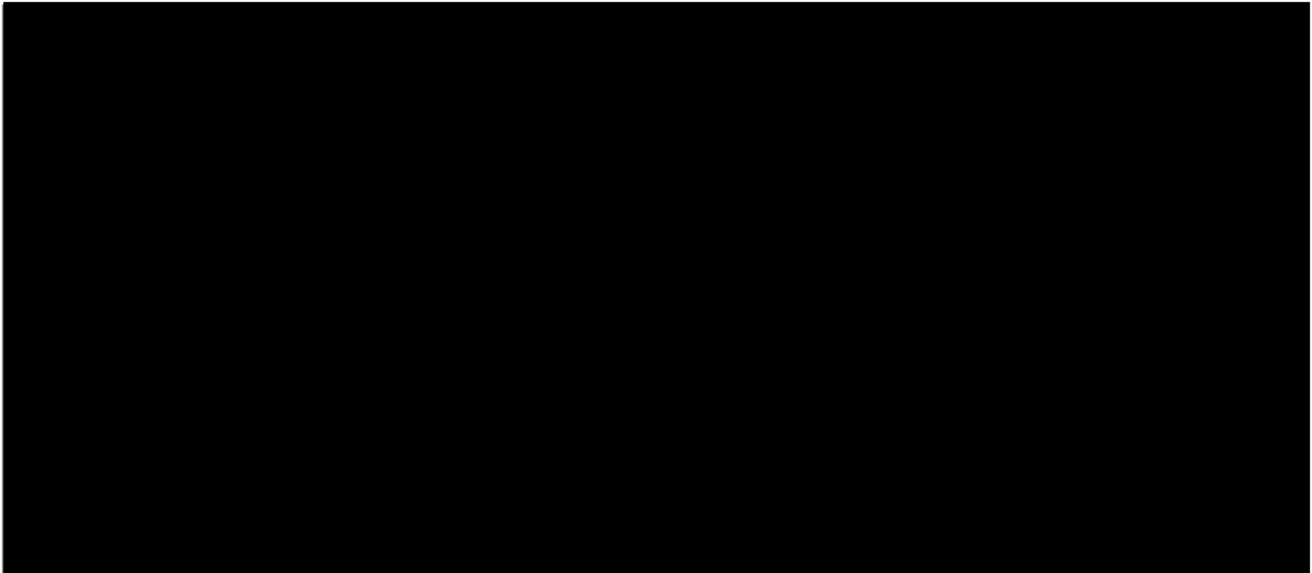
A large black rectangular redaction box covering the entire content of Table 13.

Table 14

A large black rectangular redaction box covering the entire content of Table 14.

⁸²¹ DOJ RFP 57 DFP Fees Data is used for this analysis. It consists of files Bates numbered GOOG-AT-DOJ-DATA-000247050 to GOOG-AT-DOJ-DATA-000247053. Rows with the column “company_name” containing “youtube” are excluded. The column “pub_service_country_code” is restricted to “US.” A customer is defined as “paying customer” if the total value of “billed_amout_usd_monthly_fx” in a year is positive.

⁸²² DOJ RFP 57 DFP Fees Data is used for this analysis. It consists of files Bates numbered GOOG-AT-DOJ-DATA-000247050 to GOOG-AT-DOJ-DATA-000247053. Rows with the column “company_name” containing “youtube” are excluded. The column “pub_service_country_code” is restricted to “US.”

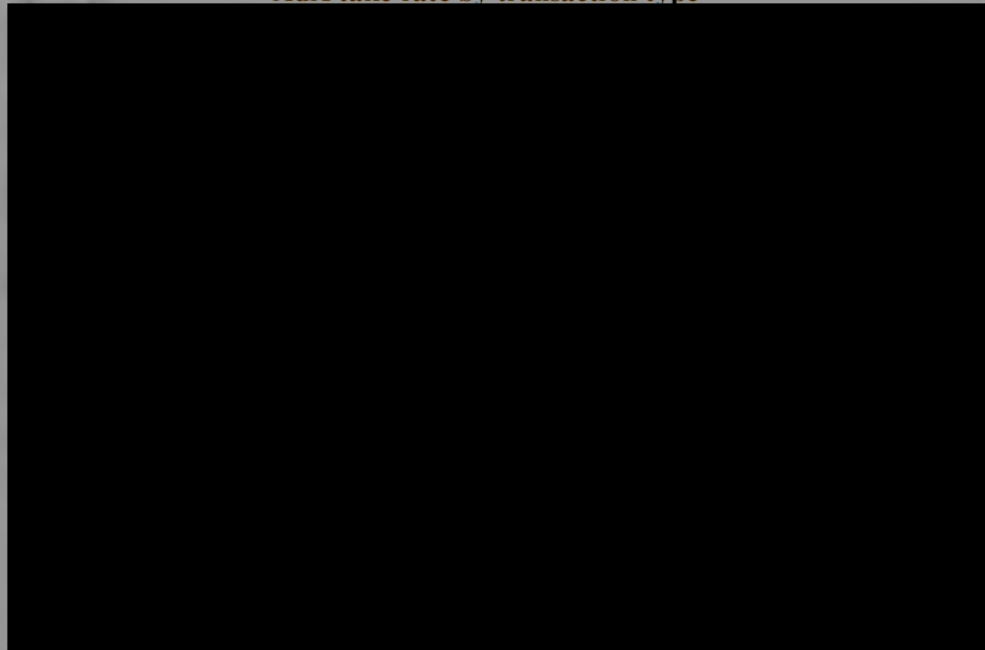
2. AdX take rate

Figure 28



Figure 29

AdX take rate by transaction type⁸²⁴



⁸²³ Source: RFP 243 AdX Submission Data.

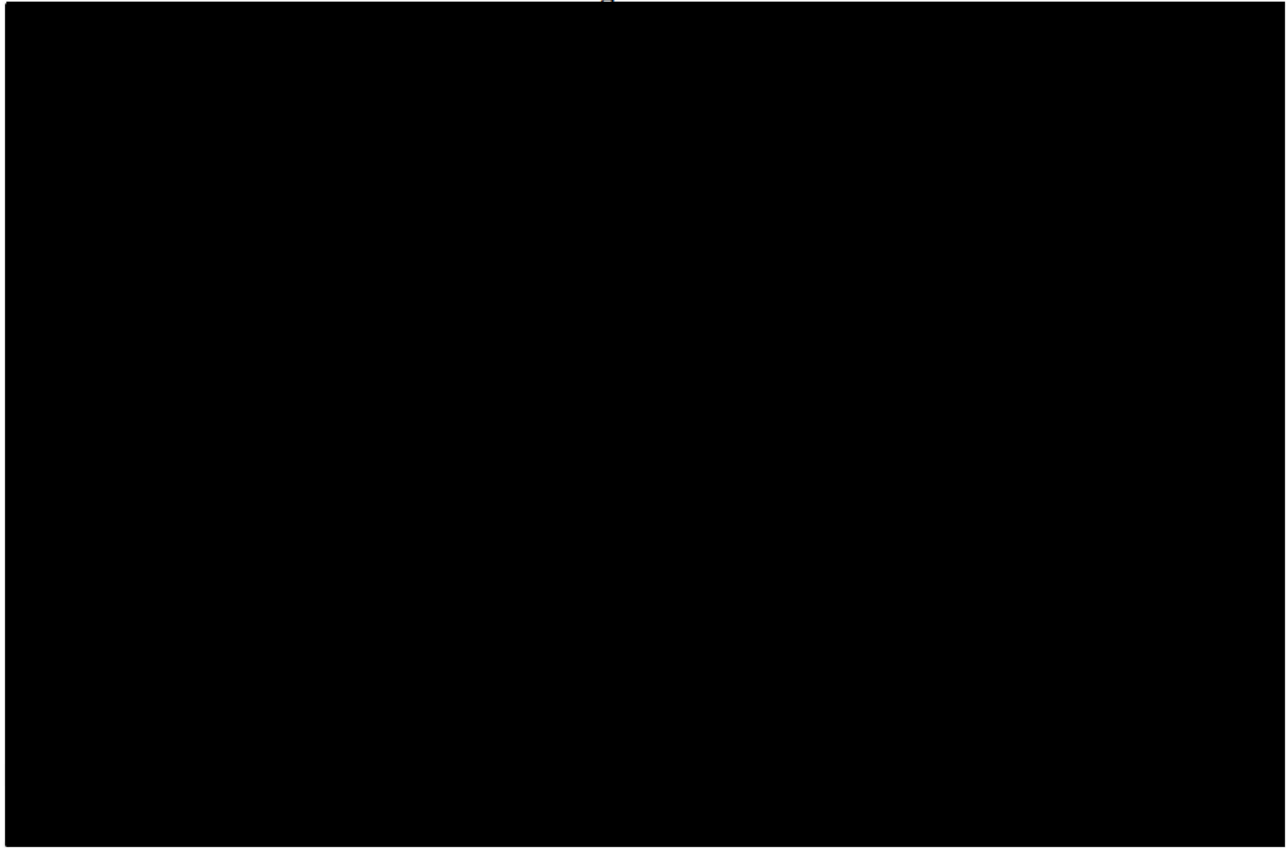
⁸²⁴ Source: RFP 243 AdX Submission Data.

3. Google Ads and DV360 take rates show market segmentation by inventory type and publisher product

516. Figure 30 shows Google Ads' and DV360's take rates for display ads by publisher product and inventory source. The figure is constructed using January 2020 through March 2024 Google Ads Submission data and the DV360 XBridge data. Average take rates are shown by publisher product and inventory source applicable to the 'Display' ad format. The 11 possible categories of publisher products are AdExchange, AdExchange-App, AdExchange-Games, AdExchange-Video, AdMob, AFC, AFG, AFV, Demand Product, Non-Google Inventory, and YouTube. The 6 possible categories of inventory sources are AdExchange, YouTube, AdMob, AdSense, Demand Product, and 3PE. Average take rate is calculated based on the proportion of Net Revenue to Revenue over the time period for each combination of Google ad-buying tool, publisher product, and inventory source for the 'Display' ad format.

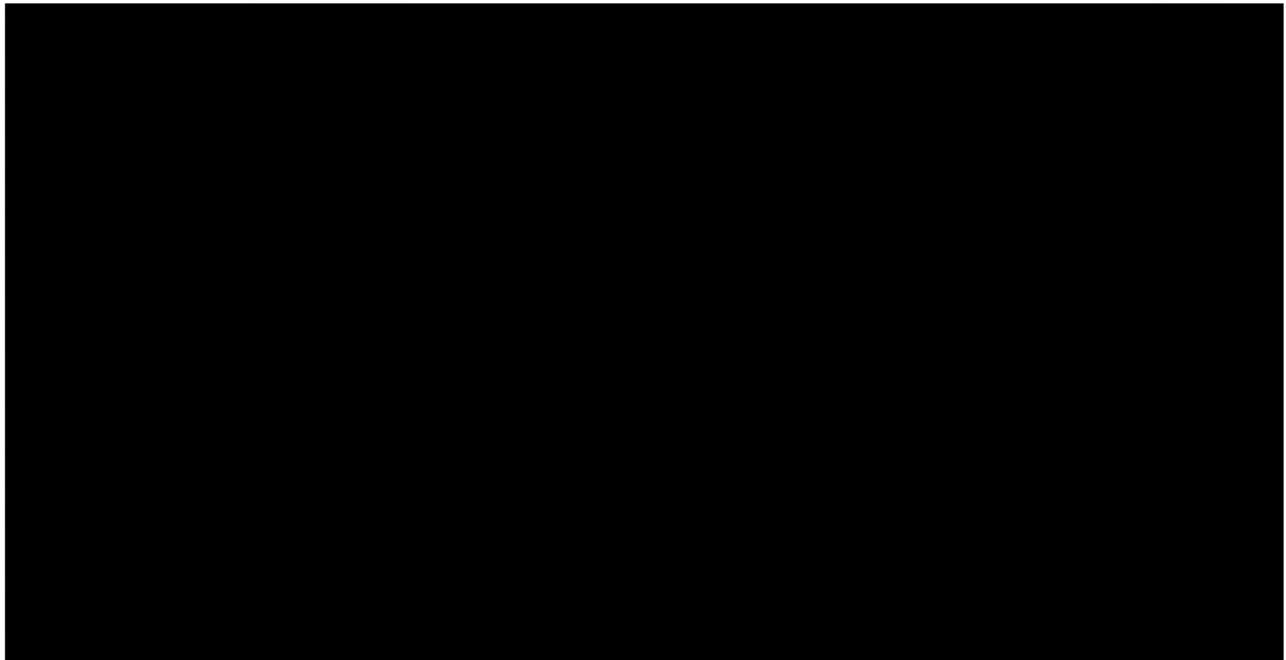
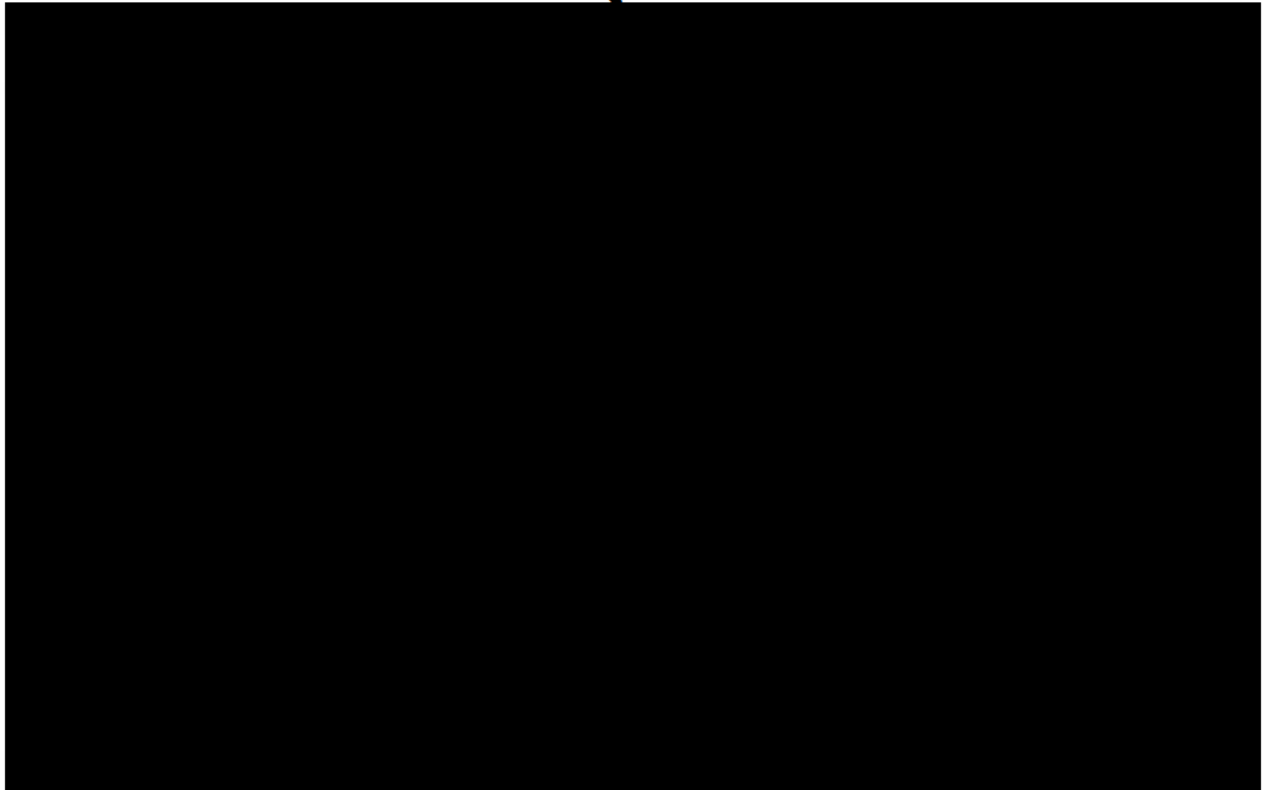
517. The take rates show [REDACTED]
[REDACTED]. The same holds true when comparing take rates for [REDACTED]. Furthermore, when comparing the display ads take rate and the video ads take rate in figures 30 and 31 respectively, take rates [REDACTED] between the two formats. This suggests a certain level of price discrimination between different ad formats, making them separate markets.

Figure 30



⁸²⁵ Data: RFP 243 Google Ads Submission.

Figure 31



Year-Month

⁸²⁶ Data: RFP 243 Google Ads Submission.

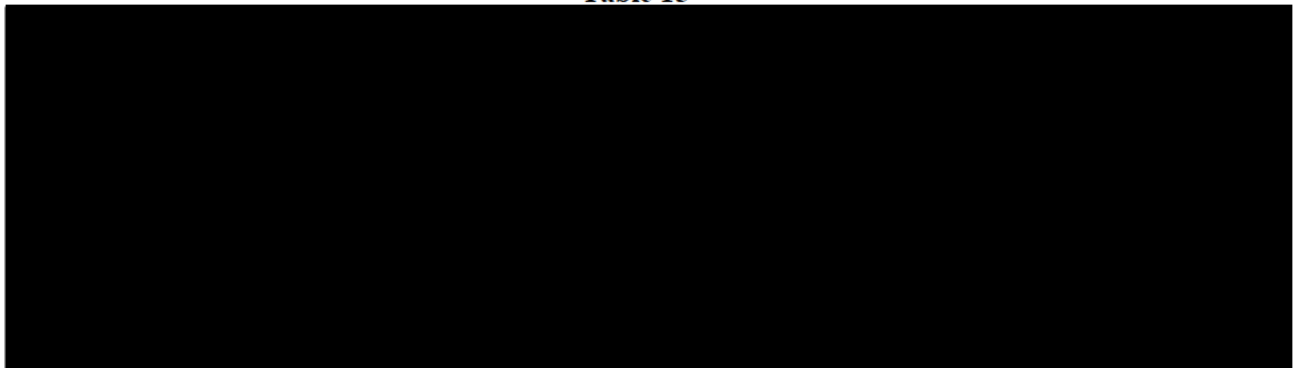
⁸²⁷ DOJ RFP 51 52 Data is used for this analysis. The column “country” is filtered into “US.”

E. Corrections to Professor Baye's AdX publishers multi-homing analysis

1. Publisher inventory type

518. Table 15 is constructed using the web property id level data since it is the “main entity used for inventory management, ad serving, revenue reporting, and monetization.”⁸²⁸ I used the XPP-M data in 2021 without loss of generality. To measure publishers' inventory types, I aggregate the column “pub_product”⁸²⁹ into four property groups: (1) Open web display defined in my Opening Report (including Demand Product, AFC, AdExchange, Non-Google Inventory, AFG, AFV, AdExchange – Games); (2) AdMob; (3) AdExchange – Video; and (4) AdExchange – App.

Table 15



519. The results show that [REDACTED]. Approximately [REDACTED] percent of the publisher properties are open web display inventory and [REDACTED] percent are not. Therefore, the open web display defined in my Opening Report covers the majority of publishers' inventory types. However, a publisher can have multiple properties.

520. Professor Baye defines a publisher at the “publisher_parent_id” and “publisher_parent_name” level. He does this because he wants to calculate over publishers rather than publisher property. However, he makes an error. Professor Baye defines the ad transaction channels as the combinations of publisher products and transaction types. For example, suppose a publisher has only open web display inventory, but sells the inventory via Direct Deals and Open Auction, then Professor Baye reports that publisher as having multiple inventory types (“ad channel” in his definition). Correcting this mistake, I obtain the following table.

⁸²⁸ See the code book in the Letter Appendix.

⁸²⁹ The column “pub_product” identifies from a sell-side perspective the Google product used by the publisher or identifies when an ad was sent to a third-party exchange. *See* the Appendix A.

⁸³⁰ The XPP-M data is used for this analysis. The column “publisher_billing_country_code” is filtered into “US” and the data in 2021 is selected without loss of generality. I aggregate the column “pub_product” into four property groups: (1) Open web display (including Demand Product, AFC, AdExchange, Non-Google Inventory, AFG, AFV, AdExchange – Games); (2) AdMob; (3) AdExchange – Video; and (4) AdExchange – App. A publisher is defined by the “web property id.”

Table 16



2. Publisher transaction type

521. I followed Professor Baye's approach defining direct deals via AdX.⁸³² Specifically, an impression is transacted via direct deals if its transaction type is "Preferred Deal," "Programmatic Guaranteed," or "Private Auction." However, a direct deal should be limited to one or two of these categories.

Table 17



522. Over [REDACTED] percent of the publishers used only Open Auction, Open Bidding, or First Look for their ad transactions in 2021. Only [REDACTED] percent of the publishers used other transaction types, including Programmatic Guarantee, Preferred Deal, or Private Auction. And around [REDACTED] percent of the publishers used both. These numbers indicate that [REDACTED].

⁸³¹ The XPP-M data is used for this analysis. The column "publisher_billing_country_code" is filtered into "US" and the data in 2021 is selected without loss of generality. I aggregate the column "pub_product" into four property groups: (1) Open web display (including Demand Product, AFC, AdExchange, Non-Google Inventory, AFG, AFV, AdExchange – Games); (2) AdMob; (3) AdExchange – Video; and (4) AdExchange – App. The last three are classified as other ad inventory types. A publisher is defined by the "publisher_parent_id" and "publisher_parent_name."

⁸³² In the Appendix VII of his report, Professor Baye defines "Display Ads (Narrow)" and "Display Ads (Narrow) Plus Direct Deals" separately, so the difference between them is to be direct deals. In AdX Submission data, the difference is characterized by "transaction_type_name" being "Preferred Deal," "Programmatic Guaranteed," "Private Auction," "Marketplace Package," or "Sponsored Product."

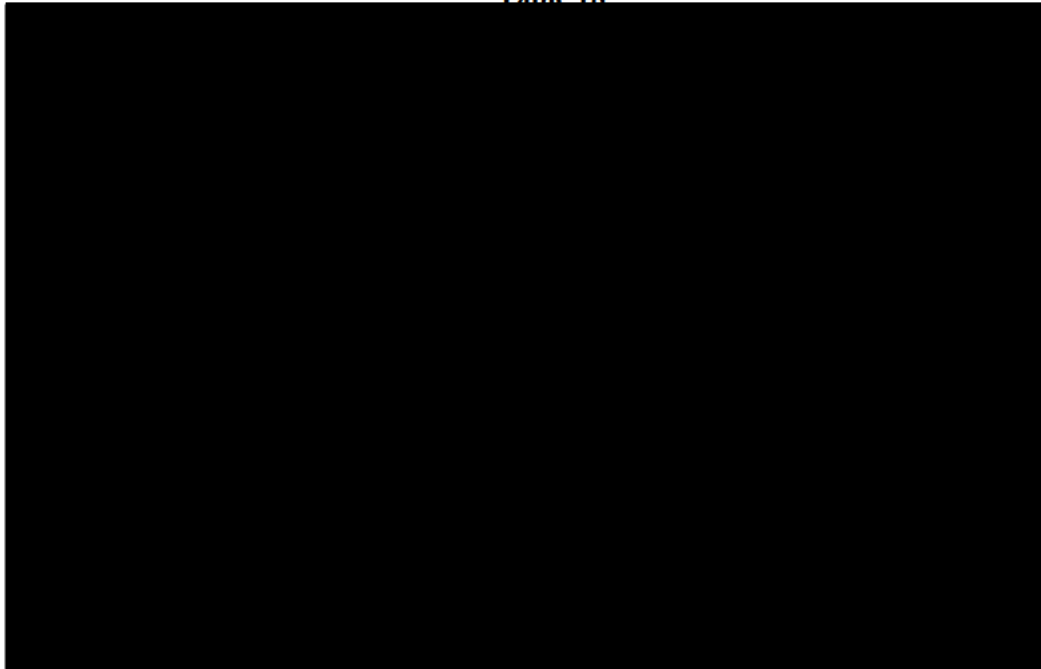
⁸³³ The XPP-M data is used for this analysis. The column "publisher_billing_country_code" is filtered into "US" and the data in 2020 is selected without loss of generality. The transaction type "Auction (OA, OB, FL)" includes Open Auction, Exchange Bidding, Open Bidding with Direct-Pay Buyers, Open Bidding with Networks, and First Look. A publisher is defined by "publisher parent id" and "publisher parent name."

F. Corrections to Professor Baye's advertiser multi-homing analysis

1. Distribution of advertisers by size in Google Ads and DV360

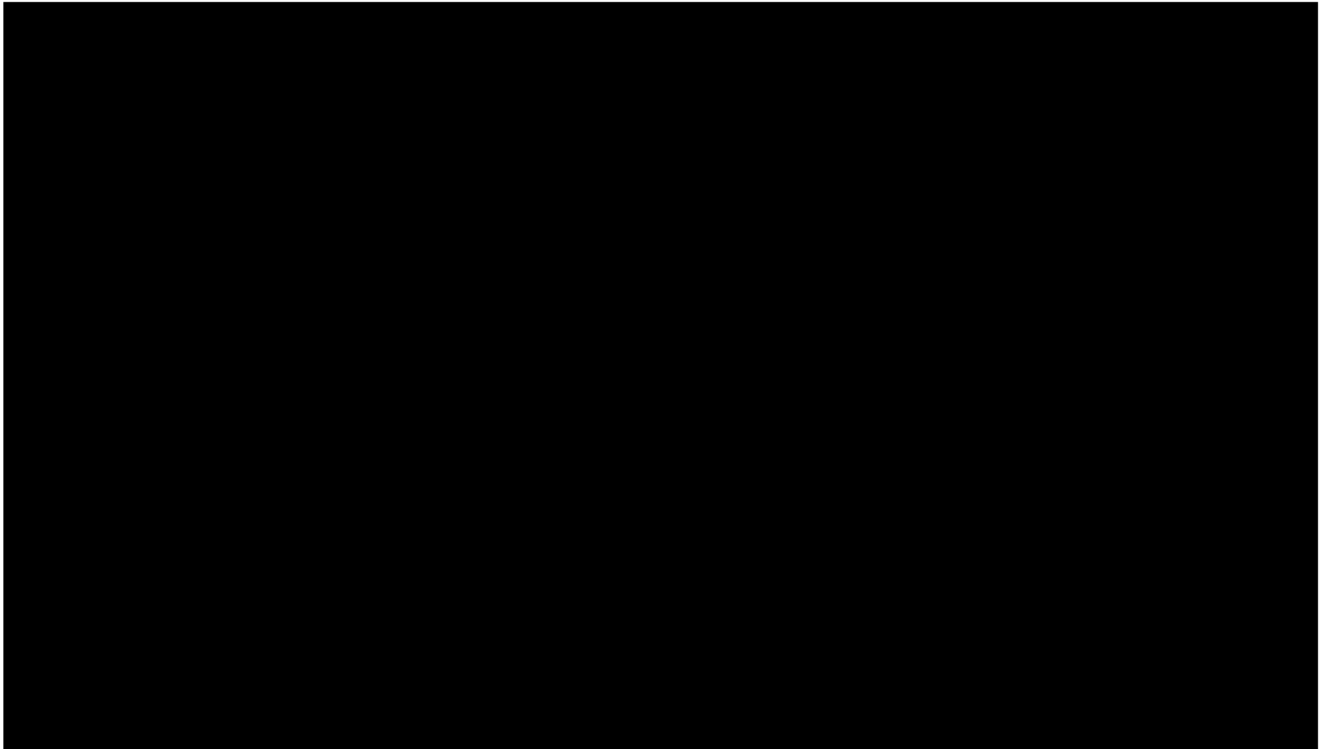
523. Table 18 is constructed using Google Ads Submission data for the period January 2020 through March 2023. Advertisers are classified into 10 distinct spend bands based on average monthly spend over the period on Google Ads to determine the count of advertisers listed in the 'number of advertisers' column. The 'percent of advertisers' in each spend band is based on the 'number of advertisers' with average monthly spend within the band divided by the total number of advertisers across all monthly spend bands.

Table 18



524. Table 19 below is constructed using Xbridge DV360 data for the period January 2020 through March 2023. Advertisers are classified into 10 distinct spend bands based on average monthly spend over the period on DV360 only to determine the count of advertisers listed in the 'number of advertisers' column. The 'percent of advertisers' for each spend is based on the 'number of advertisers' with average monthly spend within the band limits divided by the total number of advertisers across all monthly spend bands.

⁸³⁴ RFP 243 Google Ads Submission.

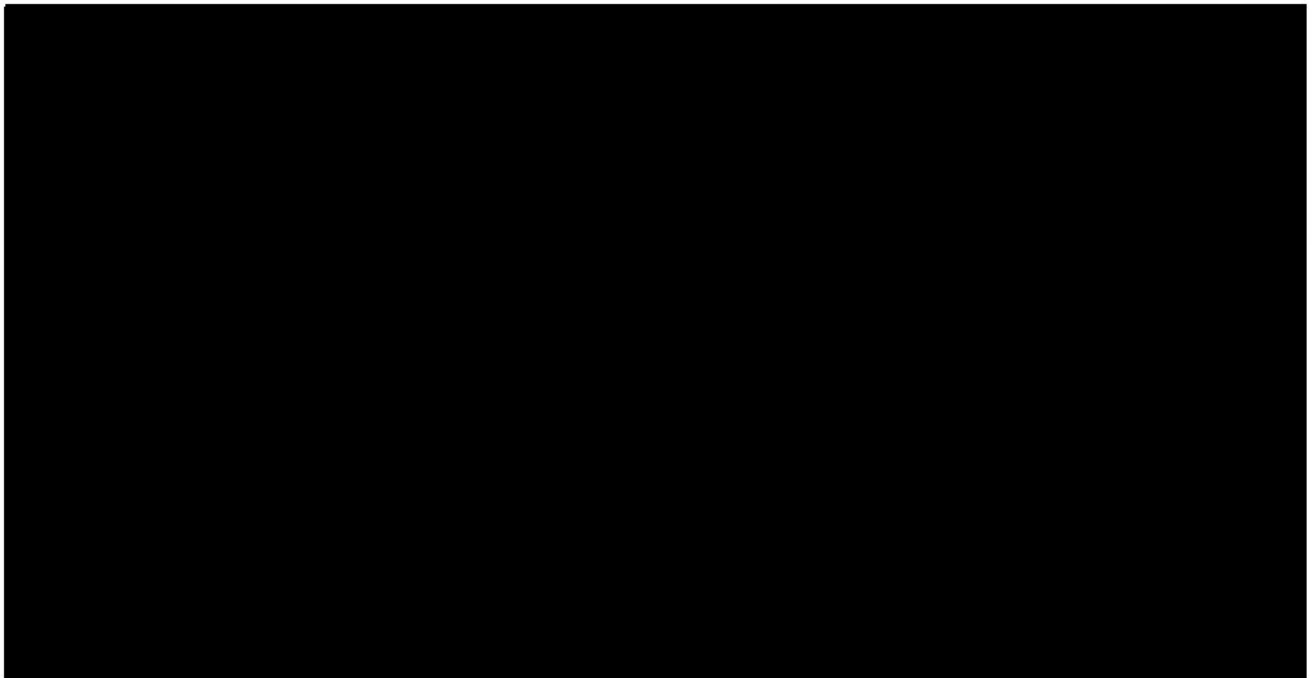
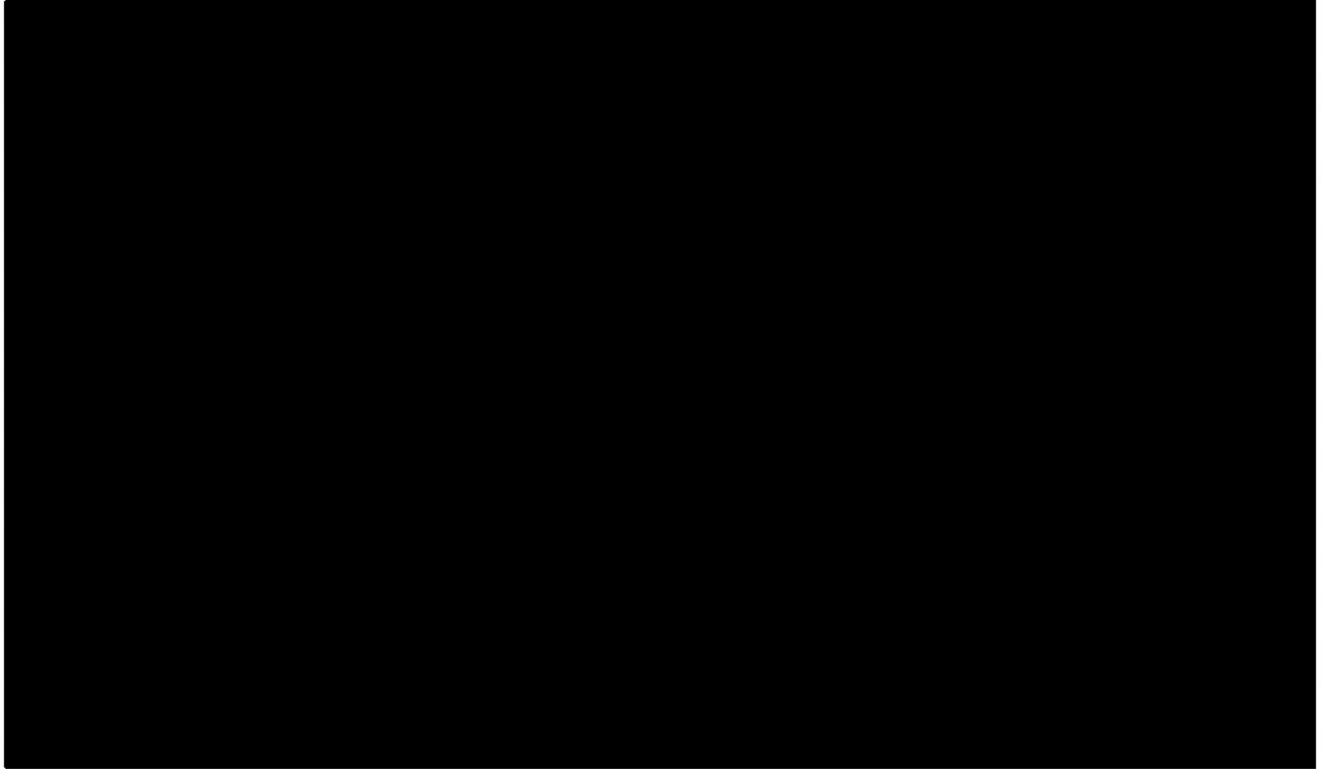


2. Inventory sources accessed by Google Ads and DV360

525. Figure 33 and Figure 34 show the share of advertiser revenue across different inventory sources for Google Ads and DV360 respectively by average monthly spend of advertisers. Each bar captures the total spend by advertisers in the specific spend band scaled to 100%. The percent for each inventory source for each spend band is calculated as total advertiser spend on the inventory source across all advertisers within the spend band divided by total spend by advertisers within the spend band.

⁸³⁵ Xbridge DV360 Submission.

Figure 33



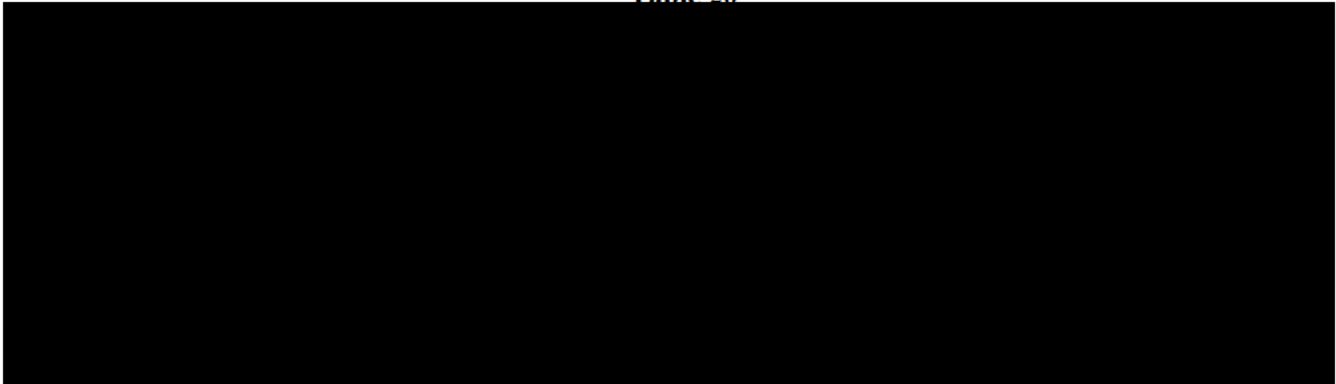
⁸³⁶ RFP 243 Google Ads Submission, Xbridge DV360 Submission.

⁸³⁷ RFP 243 Google Ads Submission, Xbridge DV360 Submission.

3. Multi-homing across DV360 and Google Ads for display ads via ad exchanges is extremely rare

526. Table 20 shows that out of [REDACTED] advertisers that used Google Ads for display ads in the period January 2020 to March 2023, less than [REDACTED] advertisers also used DV360 to access the same inventory source at any point during this period. This constitutes [REDACTED]% of all advertisers on Google Ads in this period.⁸³⁸

Table 20

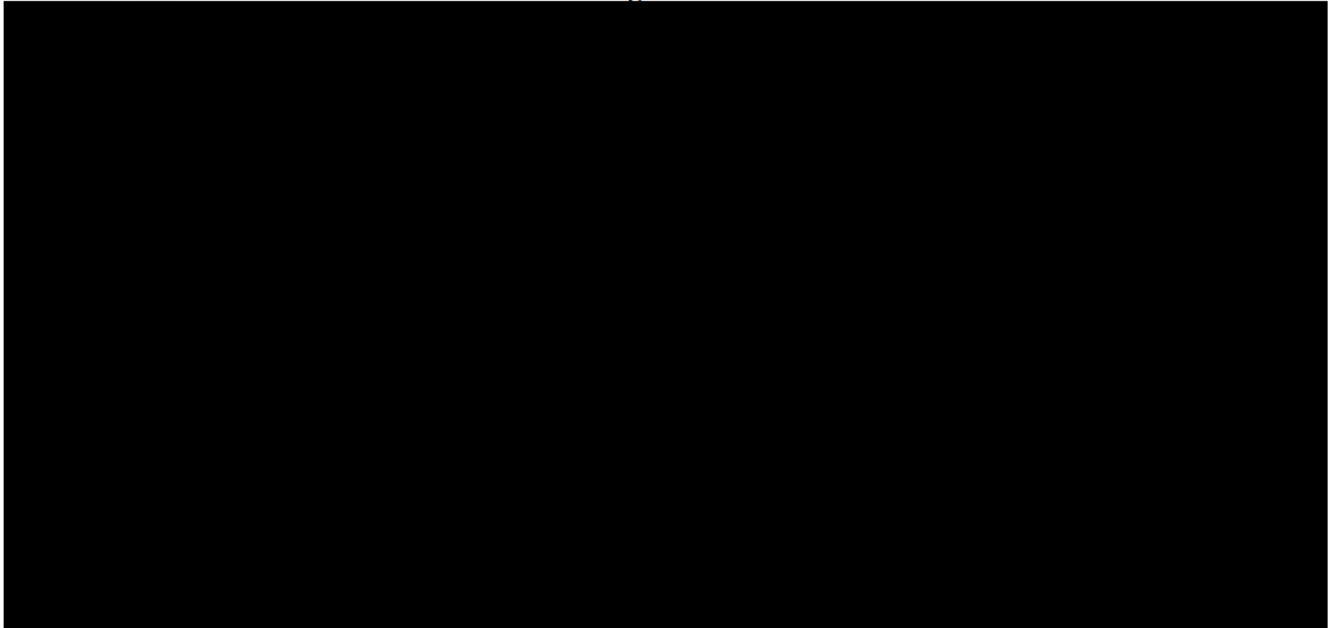


527. Figure 35 below shows the percentage of advertisers that use both Google Ads and DV360 for display Ads by advertiser spend band. The figure is restricted to all advertisers with average monthly spend less than \$10,000. Advertisers have been categorized into various categories using their average monthly spend on Google Ads during the period January 2020 to March 2023. For each spend band, the percentages are calculated by dividing the number of advertisers using both Google Ads and DV360 by the total number of advertisers using Google Ads.

⁸³⁸ I use Professor Baye's methodology to identify advertisers using display ads. For DV360, I restrict to transactions where ad_format is Display, product_area is DVA, environment is either Desktop, Mobile Web, Unknown, or Web & inventory source is restricted to 3PE, AdExchange, AdSense, Demand Product & transaction_type is Open Auction or Unknown. For Google Ads, I restrict to transactions where ad_format is Display, product_area is DVA, environment Web & inventory source is restricted to 3PE, AdExchange, AdSense or Demand Product, front_end, is AdWords & transaction_type is Open Auction.

⁸³⁹ RFP 243 Google Ads Submission, Xbridge DV360 Submission.

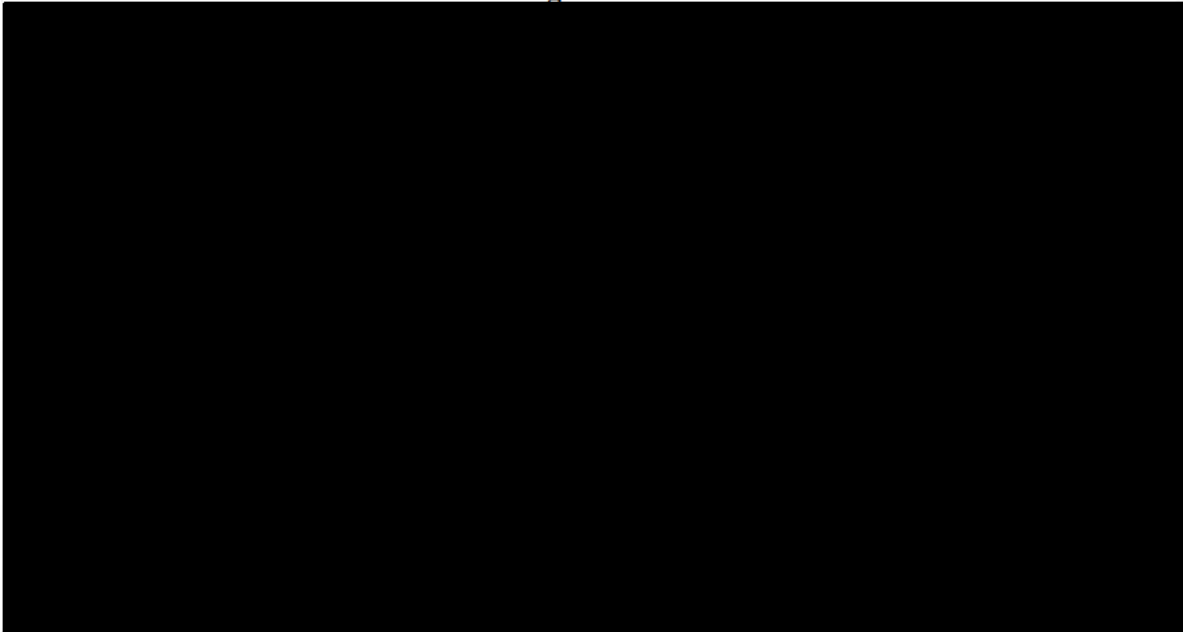
Figure 35



528. Figure 36 shows the Google Ads ad spend of advertisers that use both Google Ads and DV360 as a share of total Google Ads ad-spend by advertisers within each spend band. The figure is restricted to all advertisers with average monthly ad-spend of less than \$10,000 during the period January 2020 to March 2023 who purchased display ads. The numerator for each spend band is calculated as the sum of all Google Ads ad spend from advertisers who use both Google Ads and DV360 to purchase the same. The denominator for each spend band is the sum of all Google Ads ad spend by all advertisers within the spend band that used Google Ads to purchase display Ads in the same period.

⁸⁴⁰ RFP 243 Google Ads Submission, Xbridge DV360 Submission.

Figure 36



529. Large advertisers with spend greater than \$10,000 have some spend on Google Ads but that's likely due to left-over spend from search.⁸⁴²

4. Multi-homing across Google Ads and third-party ad buying tools is extremely rare

530. I analyze advertiser multi-homing on Google Ads and third-party tools in 2022. To get the number of advertisers using both Google and third-party buying tools each year, I follow the methodology used by Professor Baye in the analysis for Figure 52 and Figure 53 of his report.

531. I first summarize the DRX internal stats data to get the total advertising cost (in USD) for each advertiser by buyer network ID, AdX ad source type, platform type, creative type ID and transaction type. The data is restricted to display ads shown by U.S. publishers and excludes YouTube inventory, video inventory and mobile app requests.⁸⁴³ The buyer network name is retrieved from the crosswalk datasets used by Professor Baye and mapped to the DRX internal data extract using an iterative process he employs.⁸⁴⁴

⁸⁴¹ RFP 243 Google Ads Submission, Xbridge DV360 Submission.

⁸⁴² Google. "About Display Expansion on Search campaigns". Google Ads Help. (Undated) Accessed on September 4, 2024. <https://support.google.com/google-ads/answer/7193800?hl=en>

⁸⁴³ This restriction is imposed by Professor Baye's Figure 52 to arrive at display ads. He identifies transactions in "narrow" display market as transactions where mobile app requests, video inventory and YouTube inventory all take the value zero.

⁸⁴⁴ Buyer network names are first matched on buyer network ids using the dataset `mdl_rfp_243_adx_submission_buyer_network.dta`. All unmatched records are subsequently matched to datasets `doj_drx_adx_buyer_network_id_crosswalk.csv`.

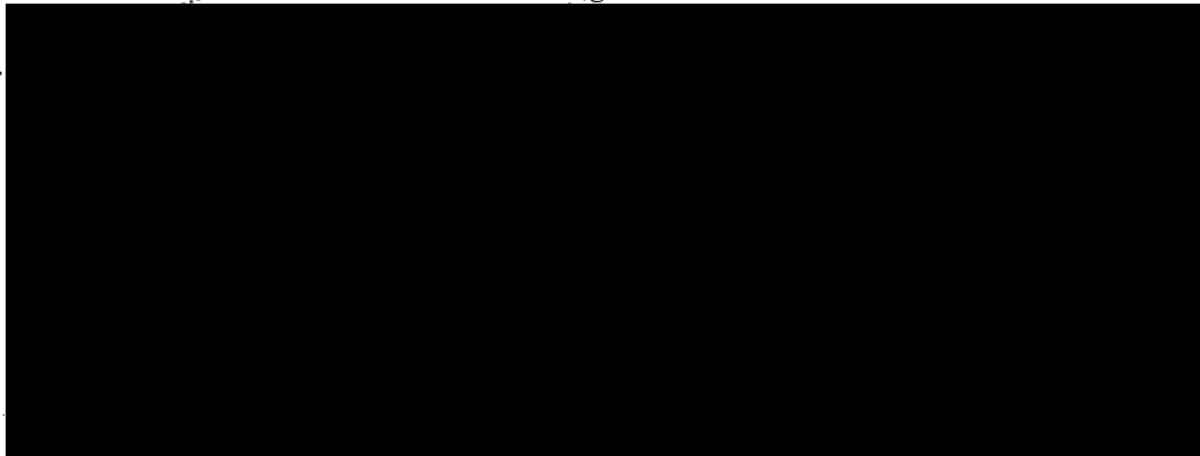
532. An advertiser is identified as using Google Ads buying tool if the variable buyer network name takes the value “Google AdWords”. Conversely, an advertiser is identified as using a third-party tool when the buying network is other than Google AdWords. An advertiser will be identified as using Google Ads and third-party buying tools if they use both the types of tools in any month of 2022.

533. Following Professor Baye’s approach, transactions that are related to — (i) creative types that have “Video,” “Instream,” or “Trueview” in their description, (ii) platform such as “GameConsole,” “SetTopBox,” and “CTV”, (iii) ad source type that are described as “No Ad” are excluded. Further, all transactions where the advertiser cost is zero in 2022 using a particular buyer network, transaction type and ad source type are excluded.

534. Next, I calculate the total number of advertisers in the display ads market that used Google Ads in 2022 and the corresponding total advertiser revenue from the advertisers in the display market.⁸⁴⁵

535. Figure 37 shows the advertisers that use both Google Ads and third-party buying tools as a percentage of all advertisers using Google Ads for display ads in 2022. The numerator is the total number of advertisers who use both Google Ads and at least one other third-party tool. The denominator is the total number of advertisers in the display market using Google Ads.⁸⁴⁶

Figure 37



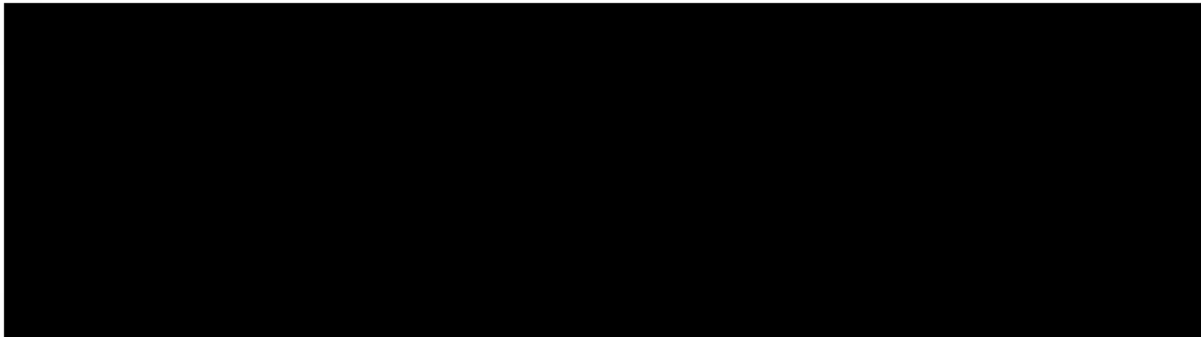
536. Table 21 shows the number of advertisers that use both Google Ads and third-party buying tools as percentage of total advertisers using Google’s buying tools for display ads in 2022. The numerator is the

⁸⁴⁵ These are calculated using RFP 243 Google Ads data.

⁸⁴⁶ The numerator is calculated using DRX Internal Stats dataset, the denominator is calculated using RFP 243 Google Ads Submission. The number of advertisers using Google Ads in the denominator are counted across advertiser parent ID. The number of advertisers multi-homing across Google Ads and third-party buying tools are counted using advertiser ID. To the extent that a parent advertiser ID will encompass multiple advertiser ids, the percentage calculated will overestimate the percentage of multi-homers.

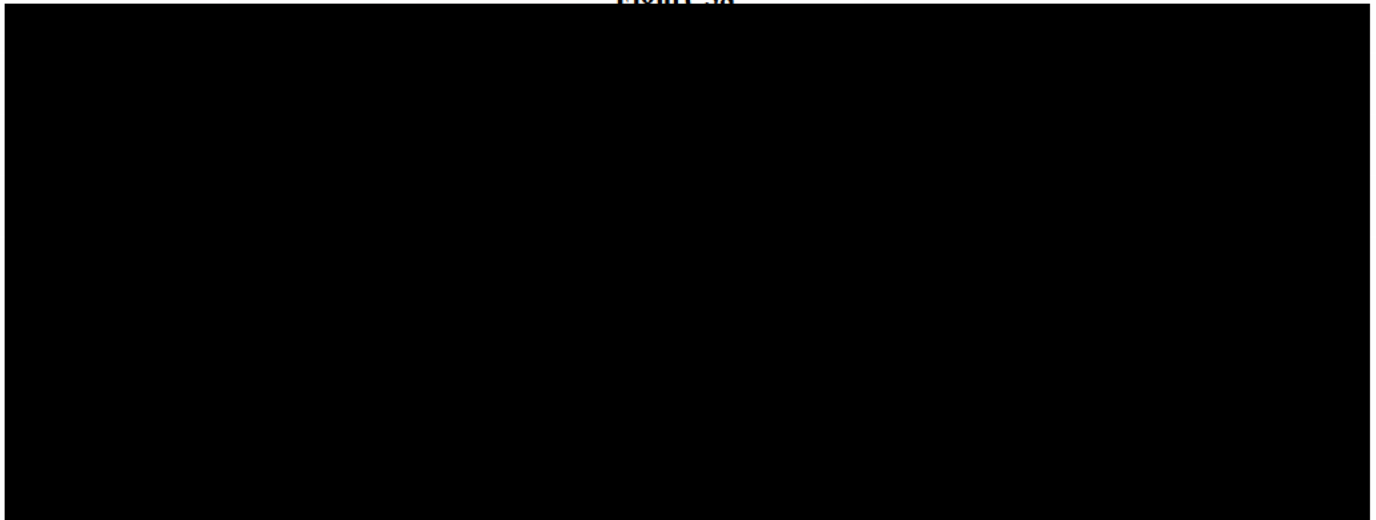
⁸⁴⁷ DRX Internal Stats, RFP 243 Google Ads Submission

total number of advertisers who multi-home across Google Ads and at least one other third-party tool. The denominator is the total number of advertisers in the display market using Google Ads.



537. Figure 38 presents the advertising spending on Google Ads by advertisers that multi-home on Google Ads and third-party buying tools, as a percentage of the total spending by all advertisers on Google Ads. The data is restricted to display ads. The numerator captures the total advertiser cost on Google Ads across all advertisers who multi-home on Google Ads and a third-party ad buying tool. The denominator is the total of advertiser gross revenue by advertisers on Google Ads restricted to display ads.

Figure 38



538. Table 22 presents the advertising spending on Google Ads by advertisers that multi-home on Google Ads and third-party buying tools, as a percentage of the total spending by all advertisers on Google Ads. The data is restricted to display ads. The numerator captures the total advertiser cost on Google Ads across all advertisers who multi-home on Google Ads and a third-party ad buying tool. The denominator is the total of advertiser gross revenue by advertisers on Google Ads restricted to display ads.

⁸⁴⁸ The number of advertisers using Google Ads in the denominator are counted across advertiser parent ID. The number of advertisers multi-homing across Google Ads and third-party buying tools are counted using advertiser ID. To the extent that a parent advertiser ID will encompass multiple advertiser ids, the percentage calculated will overestimate the percentage of multi-homers. DRX Internal Stats, RFP 243 Google Ads Submission

⁸⁴⁹ DRX Internal Stats, RFP 243 Google Ads Submission

Table 22

G. Corrections to Professor Baye's tying analysis

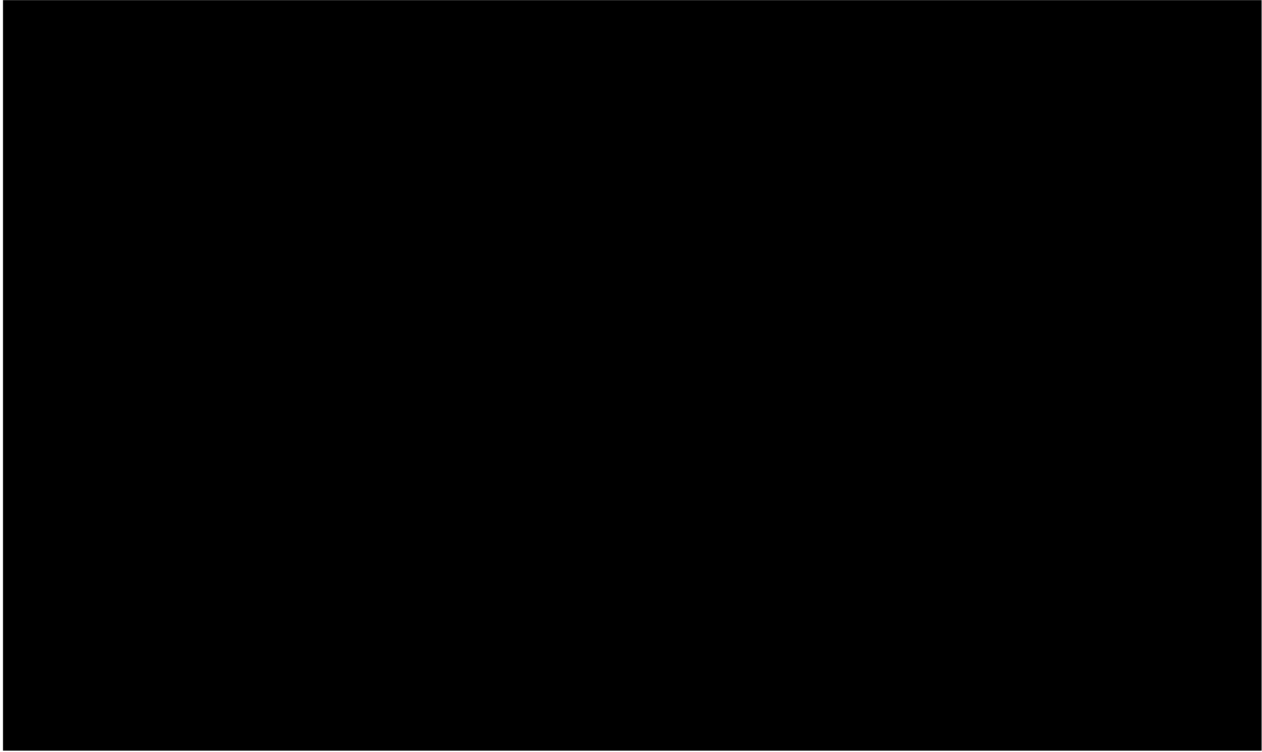
539. The share of AdX publishers' impressions that are not from DFP was stable at around [REDACTED] percent before 2016. After 2016 when Google tied AdX to DFP, the share decreased to [REDACTED] percent in 2021. These [REDACTED] percent impressions were through "AdX direct tag."

⁸⁵⁰ DRX Internal Stats, RFP 243 Google Ads Submission

⁸⁵¹ RFP 243 AdX Submission data is used for this analysis. The column "country_criteria_id" is filtered to be "2840," which represents the US. The column "is_mobile_app_request" is filtered to be "False." The column "transaction_type_name" is filtered to be values not related to "Open Bidding." A publisher is defined by "web_property_id." Impressions are "AdX direct tag" if the column "is_adx_direct" is equal to "True." The share of impressions is calculated as the ratio between the impression that are using AdX direct tag and the total impressions in the data with the filters. The column "matched_impressions" is used to calculate the share and it gives similar result to use the column "impressions."

540. Moreover, Figure 40 shows that all the DFP publishers not using AdX transacted less than █ percent of total DFP impressions after 2018.

Figure 40



H. Analysis of Professor Baye's proposed corrections to my data analysis of DRS

541. Professor Baye asserts that my data analyses of DRS contain several material errors that lead me to draw incorrect conclusions about DRS being anti-competitive. He describes three data corrections that he applies: (i) accounting for the "Gmob correction" specified in Google's letter, (ii) averaging take rates over all users with no geographical restriction, and (iii) inclusion of all transaction types (open auction and first look transactions).⁸⁵³

542. Furthermore, he claims that my conclusions heavily rely upon certain outliers that have no relevance to the way that DRS actually operated.⁸⁵⁴ I have examined the relevance and impact of each of

⁸⁵² RFP 243 DFP Reservations data, AdX data, and AdSense Backfill data are used for this analysis. In these datasets, the column "country_criteria_id" is filtered to be "2840," which represents the US. In the AdX data, the column "is_adx_direct" is filtered to be "False." Rows with non-positive impressions are excluded. A publisher is defined by "gfp_network_id." These datasets are aggregated and matched at the "gfp_network_id" and year level. A DFP publisher who did not use AdX is defined when the column "transaction_type_name" is not related to "Open Auction" or "First Look." The share is calculated as the ratio of the following two impression counts in each year: (1) the number of impressions from DFP publishers who did not use AdX, and (2) the number of impressions in all three datasets.

⁸⁵³ Baye Report, ¶623.

⁸⁵⁴ Baye Report, ¶626.

the proposed corrections and outliers on my analyses. I find that Professor Baye's corrections are meritless and do not change my conclusion.

1. "Gmob correction"

543. The Baye Report does not precisely explain the "Gmob correction" or its purpose. After reviewing Professor Baye's code, I have found that his correction re-estimates gross revenue for the month of July 2014 and before. The Google letter that Professor Baye cites⁸⁵⁵ explains that since Google did not have readily available gross revenue data prior to July 8, 2014, it has provided "an estimate of the gross revenue based on the publisher-net-revenue multiplied by a constant factor of [REDACTED] corresponding to the global average for the remaining days of July 2014". The letter does not indicate that further corrections need to be made. Professor Baye's correction is, therefore, unnecessary.⁸⁵⁶ Hence, I do not implement the proposed correction.

2. Inclusion of worldwide users

544. The Baye Report opines that the DRS analyses should include worldwide users as Professor Rinard's review of the DRS source code reveals that Google's algorithm did not place limitations on geographical region when calculating the average AdX revenue share of [REDACTED]% for each publisher⁸⁵⁷. I disagree with Professor Baye's proposed correction as the relevant geographic market for the four markets is the United States —and hence do not implement it.

3. No restriction by the type of transaction

545. Professor Baye opines that my analysis is flawed as it is restricted to open auctions. He asserts that as Google's algorithm did not place limitations on transaction types, first-look deal transactions should be included. This criticism is unfounded on several accounts.⁸⁵⁸

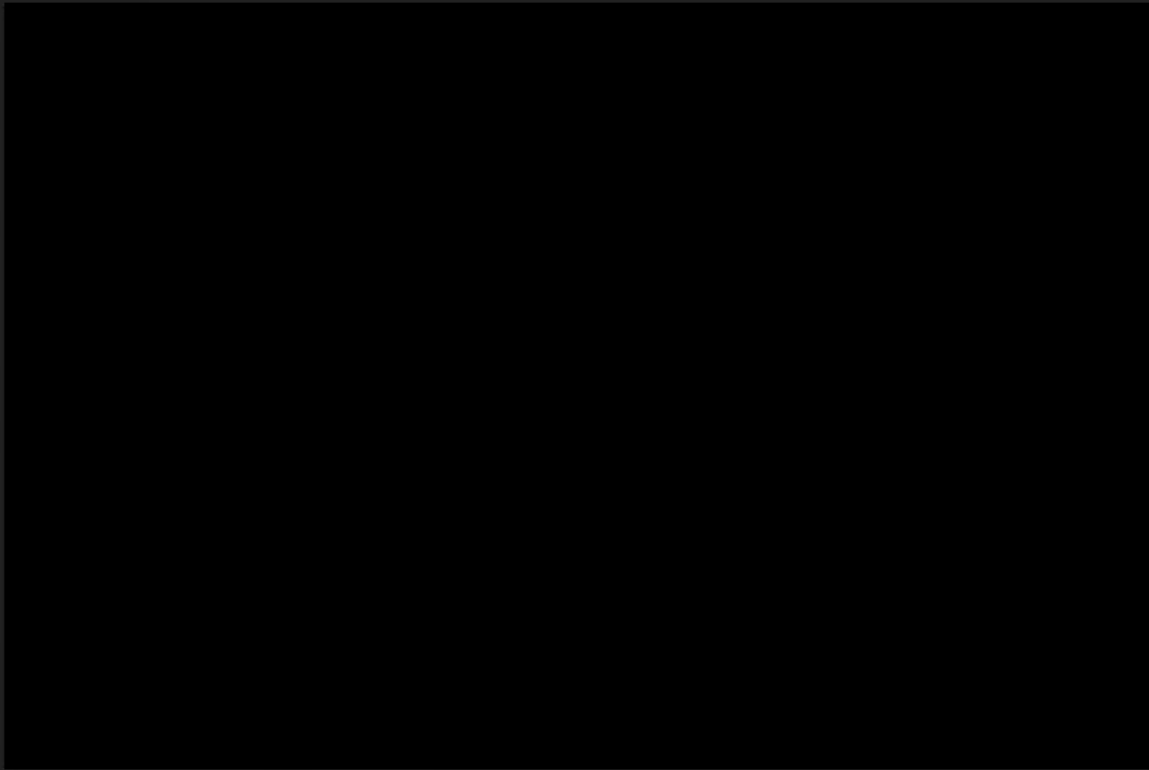
546. First, first-look deals are very distinct from other transactions. The take-rate for such transactions is significantly different from that in open auctions. Below, Figure 41, Figure 42 and Figure 43 plot the take-rates for First Look transactions for each ad source — Adwords, DV360 and RTB — separately. The take-rate in First Look fall to as low as less than [REDACTED]% for DV360 and less than [REDACTED]% for demand that is sourced from RTB: Real Time Bidders.

⁸⁵⁵ GOOG-AT-MDL-008932468, at -471.

⁸⁵⁶ This can be verified using the data sourced from RFP-243 "AdX Submission".

⁸⁵⁷ Baye Report, ¶626.

⁸⁵⁸ Baye Report, ¶626, and Footnote 1177.

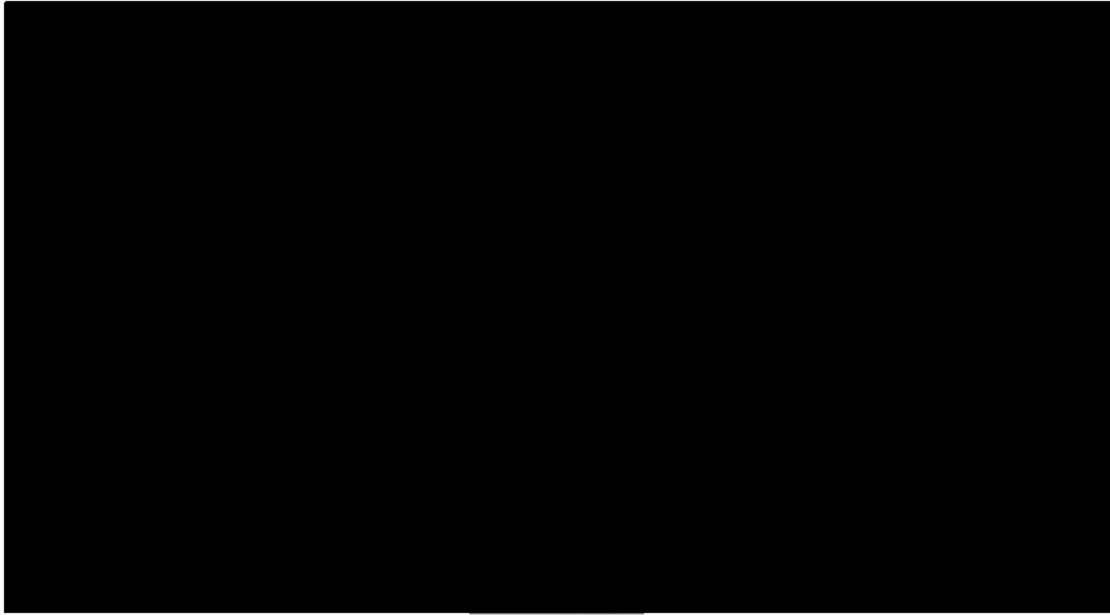


⁸⁵⁹ Data sourced from RFP-243 “AdX Submission” dataset is described as “monthly data on web display transactions through AdX and Open Bidding involving U.S. users” in 2023.05.30 D. Pearl Letter re Data Production. Filters: “country_criteria_id” is set to be “2840” (US); “ad_source_type_name” is equal to “AdWords”, “transaction_type_name” is equal to “Open Auction” or “First Look”; “is_mobile_app_request” is equal to False; “web_property_name” that contains “Test,” “test,” “demo,” or “Demo” is excluded because it can be just a test account and the take rate is skewed. Averages are taken by transaction_type_name by month. Take rates are calculated with formula “adx_net_rev_usd” divided by “gross_rev_usd” times 100. The vertical line in July 2014 represents the beginning of the DRS v1 roll out on AdX. The line in August 2015 represents when DRS v1 was fully launched on AdX. The vertical line in December 2016 represents when DRS v2 was fully launched on AdX. For the launch dates of DRS v1 and v2, see Google’s First Am. Resps. and Objs. to Plaintiff’s Third Set of Interrogs. (May 24, 2024) at 12. (“Dynamic Revenue Share launched on or about August 20, 2015. DRS v. 2 subsequently launched on or about December 1, 2016.”). Google planned to launch DRS as early as the third quarter of 2014. See GOOG-NE-13319630 at -630. “[Launch 121341] AdX dynamic sell-side revenue share (DRS) - full launch” (August 13, 2014). Internal Google email announcing the launch of DRS. The launch information notes the name of the launch is “AdX dynamic sell-side revenue share (DRS) – full launch,” the status is “Current,” and the launch date is “2014-Q3.”

Figure 42



⁸⁶⁰ Data sourced from RFP-243 “AdX Submission” dataset is described as “monthly data on web display transactions through AdX and Open Bidding involving U.S. users” in 2023.05.30 D. Pearl Letter re Data Production. Filters: “country_criteria_id” is set to be “2840” (US); “ad_source_type_name” is equal to “DV360” ; “transaction_type_name” is equal to “Open Auction” or “First Look; “is_mobile_app_request” is equal to False; “web_property_name” that contains “Test,” “test,” “demo,” or “Demo” is excluded because it can be just a test account and the take rate is skewed. Averages are taken by transaction_type_name by month. Take rates are calculated with formula “adx_net_rev_usd” divided by “gross_rev_usd” times 100. The vertical line in July 2014 represents the beginning of the DRS v1 roll out on AdX. The line in August 2015 represents when DRS v1 was fully launched on AdX. The vertical line in December 2016 represents when DRS v2 was fully launched on AdX. For the launch dates of DRS v1 and v2, see Google’s First Am. Resps. and Objs. to Plaintiff’s Third Set of Interrogs. (May 24, 2024) at 12. (“Dynamic Revenue Share launched on or about August 20, 2015. DRS v. 2 subsequently launched on or about December 1, 2016.”). Google planned to launch DRS as early as the third quarter of 2014. See GOOG-NE-13319630 at -630. “[Launch 121341] AdX dynamic sell-side revenue share (DRS) - full launch” (August 13, 2014). Internal Google email announcing the launch of DRS. The launch information notes the name of the launch is “AdX dynamic sell-side revenue share (DRS) – full launch,” the status is “Current,” and the launch date is “2014-Q3.”



547. Second, a document cited by Professor Rinard dated May 9, 2014, on DRS implementation also notes that dynamic revenue share was changed only for open auction, and the sell-side revenue share for other types of transactions (e.g. deals) was not changed⁸⁶² due to concerns about the impact of DRS on deals.”⁸⁶³

4. Impact of outlier publishers with monthly revenue less than 1000 USD

548. Apart from the three proposed corrections, Professor Baye claims that my conclusions heavily rely upon certain outliers that have no discernible relevance to the way that DRS actually operated. The purpose

⁸⁶¹ Data sourced from RFP-243 “AdX Submission” dataset is described as “monthly data on web display transactions through AdX and Open Bidding involving U.S. users” in 2023.05.30 D. Pearl Letter re Data Production. Filters: “country_criteria_id” is set to be “2840” (US); “ad_source_type_name” is equal to “RTB: Real Time Bidders”; “transaction_type_name” is equal to “Open Auction” or “First Look”; “is_mobile_app_request” is equal to False; “web_property_name” that contains “Test,” “test,” “demo,” or “Demo” is excluded because it can be just a test account and the take rate is skewed. Averages are taken by transaction_type_name by month. Take rates are calculated with formula “adx_net_rev_usd” divided by “gross_rev_usd” times 100. The vertical line in July 2014 represents the beginning of the DRS v1 roll out on AdX. The line in August 2015 represents when DRS v1 was fully launched on AdX. The vertical line in December 2016 represents when DRS v2 was fully launched on AdX. For the launch dates of DRS v1 and v2, see Google’s First Am. Resps. and Objs. to Plaintiff’s Third Set of Interrogs. (May 24, 2024) at 12. (“Dynamic Revenue Share launched on or about August 20, 2015. DRS v. 2 subsequently launched on or about December 1, 2016.”). Google planned to launch DRS as early as the third quarter of 2014. See GOOG-NE-13319630 at -630. “[Launch 121341] AdX dynamic sell-side revenue share (DRS) - full launch” (August 13, 2014). Internal Google email announcing the launch of DRS. The launch information notes the name of the launch is “AdX dynamic sell-side revenue share (DRS) – full launch,” the status is “Current,” and the launch date is “2014-Q3.”

⁸⁶² GOOG-DOJ-06867901 at -645. “Dynamic Sell-Side Revshare on AdX” (May 9, 2014). Internal strategy document written by [REDACTED] describing DRS. (“We will do this only for open auction (that is, transaction type is SECOND PRICE AUCTION). The sell-side revshare for other types of transactions (e.g. deals) is not changed.”)

⁸⁶³ GOOG-DOJ-06867901 at -643. “Dynamic Sell-Side Revshare on AdX” (May 9, 2014). Internal strategy document written by [REDACTED] describing DRS. (“I don’t think we should touch deals. That may have unintended consequences and we are likely to burn margins on exchange rate variations. The price is negotiated between the publisher and the buyer as gross value and that would be suspicious to transact. There is a risk to break troubleshooting tools /workflows as well.”)

of this figure in my Opening Report was to show the variance implied by DRS. Some of the variance comes from isolated cases but it is not all of the substantial variance. If we remove outliers in the way proposed by Professor Baye, we lose the very extreme take rates. However, we still see Google's take rate reaching █% a month for certain publishers, which is substantial and overlooked by Professor Baye.